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ABSTRACT

This manual is designed to provide some help to the educational statistician or equivalent technician who is faced with the task of providing estimates of future school enrollment in a developing country. The author first considers some of the factors determining the growth of school enrollment; needs for estimating future school enrollment; and the characteristics of short-term, medium-term, and long-term estimates. Some of the terms used in connection with estimates of future school enrollment are then defined; the types of basic data needed are specified; and the kinds of methods generally used are explained briefly. Three case studies are presented that estimate future school enrollment in the developing countries of Colombia, the Philippines, and the Sudan. These case studies are intended to illustrate the application and adaptation of certain methods to suit the needs of particular situations. The presentation concludes with some illustrative examples from actual projections of school enrollments taken from published sources in three developed countries -- the United States, New Zealand, and France. (Author/DN)

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estimating future school enrolment in developing countries

a manual of methodology

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CHAPTER I

INTRODUCTION

1. PURPOSE OF THIS MANUAL

This study was incorporated into the programme of Unesco as a result of a recommendation of the Population Commission of the United Nations at its Twelfth Session, February 1963.

Nowadays much work is done, and more talk is heard, about the planning of educational development in different countries of the world. Educational planning is sometimes undertaken or considered as part of over-all planning for the economic, social and cultural development of a country or of a group of countries within a region. This kind of planning is appropriate for countries at all stages of development, but seems particularly urgent for those countries characterized as "less developed" or "developing", since they can no longer afford the delay, wastage or set-back in their evolution due to the lack of careful planning. However, even apart from the necessity of over-all national planning in the sense indicated above, there are usually specific needs in most countries - developed as well as developing ones - for the planning of educational progress and development at the national or local level. Such needs arise, for example, when the population of a country, a province, or a city is growing at such a rate that the existing school system is not able to keep up with the needs of the growing population. Or when the character of a country or local area is rapidly changing - say from a predominantly rural to a predominantly urban character - the educational system may have to be revamped accordingly; new schools, perhaps new kinds of schools, may have to be established; new curricula or courses of study may have to be indroduced; new kinds of teachers may have to be supplied, and so forth. Sometimes, with the introduction of school reform - such as the prolongation of compulsory education, shifting of emphasis from primary to secondary or higher education, from general academic instruction to vocational and technical training - there is need for a reappraisal of the educational function and reallocation of resources among the various levels and types of education.

In these and other situations, where educational planning for the immediate or more distant future becomes an urgent necessity, one of the universal requirements is an estimation of the potential size of the school-going population, in other words the number of children and youth who would or should be enrolled in schools of different types at each of the educational levels. This particular task of estimating future school enrolment, indispensable for purposes of educational planning, generally and rightly falls on the shoulders of the educational statistician or person of similar capacity and qualification. The administrator is usually too busy with his routine duties of administration, the policy maker preoccupied with his problems of policy making, so that the laborious calculations involved in making reasonable estimates of future school enrolment must be performed by the technician.

But this is not an easy task, especially for the technician in a developing country, where basic data necessary for the calculations are usually deficient, if not entirely non-existent. To make usable bricks with the few straws at hand requires ingenuity and persistence - qualities which we would rate highly in the making of the successful technician in this field. Endowed with such qualities, the technician's job could be made still easier if he had a kit of suitable tools which could be placed in his hands and from which he could select the ones most adapted or adaptable to his particular needs.

The present *Manual* is therefore designed to provide some help to the educational statistician or equivalent technician who is faced with the task of providing estimates of future school enrolment in a developing country. We do not claim to have found a magic formula by which one can produce valid estimates of school enrolment out of a few figures relating to population, school attendance, admissions, drop-outs and the like. Nor do we guarantee that the methods suggested and illustrated in this *Manual* will be uniformly applicable to all kinds of situations or invariably lead to results free from error. We can only hope that our readers may find some of our suggestions useful for their particular purpose, and thus lead to their own discovery of the best methods to be used for the best results to be obtained in their respective situations.

2. PREVIOUS WORKS ON THIS SUBJECT

It is only fair to mention that other people before us have worked in this area, mostly in concrete situations where they have had to produce estimates of school enrolment, based on whatever data were available, and improvising or adapting certain methods which have seemed most appropriate in their circumstances. We shall not try to enumerate all such instances as have come to our knowledge, either in published or unpublished form. The reader will find some of these examples given in Chapter VII, relating to work done in three selected countries, relatively well-developed in terms of education and statistics. Space limitations do not permit us to cite other equally illuminating examples.

A previous publication of Unesco dealt with questions of methodology, based on the experience of its author in the New Zealand Department of Education, with some reference to the problems of enrolment projections for a less-developed country, such as the territory of Western Samoa.[1] Descriptions of methods used in the United States of America, by the Bureau of the Census and others working on enrolment projections, are to be found in a number of articles and publications.[2] Methods of projecting school enrolment in France have been explained in two articles published by the National Institute of Demographic Studies.[3]

3. PLAN OF THE CHAPTERS

In the following chapter we shall discuss some preliminary considerations relating to the question of school enrolment estimates. In particular we shall consider some of the factors determining the growth of school enrolment; needs for estimating future school enrolment; and the characteristics of short-term, medium-term and long-term estimates.

In chapter III we shall try to define some of the terms used in connexion with estimation of future school enrolment; specify the types of basic data needed; and explain briefly the kinds of methods generally used.

Chapters IV, V and VI will be devoted to three case studies of estimating future school enrolment in developing countries, namely Colombia, Philippines and Sudan. These case studies are intended to illustrate the application and adaptation of certain methods to suit the needs of particular situations.

Chapter VII will contain some illustrative examples from actual projections of school enrolment taken from published sources in three selected countries, namely the United States, New Zealand and France. While the methods used in these countries may not be directly applicable to many of the developing countries, the examples will show what could be done in situations where basic data are more generally available so that estimates of future school enrolment could be made with relatively more confidence and less likelihood of large errors.

It should be reiterated that the present *Manual* is concerned primarily with the problems and methods of estimating future school enrolment in developing countries, where the basic data for such estimation is usually defective or inadequate. To the extent that such deficiencies are overcome, more refined methods such as those illustrated in Chapter VII should be considered for use or adaptation.

Another limitation of this study lies in its main emphasis on the first and second levels of education, leaving out all except passing reference to the question of estimating future enrolment at the level of higher education. Since in the developing countries by far the largest part of the school-going population will be attending pre-primary, primary and secondary schools, we felt it was more appropriate to devote our attention almost exclusively to those levels. In any case, once the future school enrolment at the second level can be estimated with some degree of confidence, it would not be difficult to extend the estimation to the level of higher education, using generally similar techniques.

For the same reason estimation of vocational school enrolment at the second level is covered, but technical schools above the secondary level are left out of consideration. We might mention in passing that certain methods based on the specific needs for highly qualified manpower would be appropriate in estimating future enrolment at the level of higher education, more especially in the scientific and technical branches of learning.

The concept of future manpower requirement does, however, enter into our suggested method for estimating the future enrolment in teacher training institutions, be they at the second or higher level. The anticipated output of teachers must obviously be correlated with the expected demand for teachers at the lower levels of education. A simplified application of this method may be found in the case study on Colombia, in Chapter IV.

Other than the above reference, we have made no systematic attempt to deal with the question of estimating future requirement for teachers at each level and for each type of education. Such estimates are usually called for in conjunction with, or in addition to, the estimation of pupil enrolment. But to enter fully into a discussion of methods of estimating future needs for teachers would take us beyond the limits of our space in the present *Manual*.

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[1] Unesco. *Methods of school enrolment projection,* by E.G. Jacoby. Educational studies and documents, No. 32. Paris, 1959.

[2] See : Zitter, M. "Forecasting school enrolment for the United States and local areas," in *The Journal of Teacher Education,* Vol. V, No. 1 (March 1954). Selected references on the subject are included in an appendix to the article, e.g. : Armstrong, C.M. and M.S. Harris, *A method of predicting school-age population,* Division of Research, State Education Department, Albany, New York, 1949; Schmid, C.F. and F.S. Shanley, "Techniques of forecasting university enrolment," in *The Journal of Higher Education,* Vol. XXIII, No. 9 (December 1952).

[3] Pressat, R. "Croissance des effectifs scolaires et besoins en maîtres," and Fourastie, J. "Les travaux de la Commission de l'équipement scolaire du Commissariat général au Plan," in *Population : Revue trimestrielle de l'Institut National d'Etudes Démographiques,* 13e année, No. 1 (janv.-mars 1958), No. 2 (avril-juin 1958).

Similarly we have to refrain from entering into the related questions of estimating future requirements of classrooms and other school facilities. Estimates of such requirements are of course vitally necessary to the educational planner; they will have to be derived in part from reasonable estimates of future pupil enrolment. We shall try no more than to point the way toward achieving the latter, and must reluctantly leave our reader to his own ingenuity with regard to the former.

A final limitation is imposed concerning the estimation of financial needs of the school system, which again must be based on the estimation of pupil enrolment. To estimate the cost per pupil or per classroom, covering teachers' salaries and other recurring expenditure, or the unit cost of school buildings and other capital expenditure, one would need a large amount of detailed data of a financial nature which are not often available to the average statistician in the school system of a developing country.

This report expresses the opinions of the author and does not necessarily represent the opinions of Unesco.

CHAPTER II

SOME PRELIMINARY CONSIDERATIONS

1. FACTORS DETERMINING THE GROWTH OF SCHOOL ENROLMENT

School enrolment is expected to grow in any dynamic situation where the population is continually increasing, or the school system is progressively expanding, or where both developments are taking place. On the contrary, where population growth or school expansion is arrested, in any temporary or local situation, then the number of children attending school may remain unchanged or show signs of decrease. Thus the two factors which basically determine the size of the future school-going population are: (1) the expected growth of the population, or more precisely, of the school-age population; and (2) the anticipated expansion of the school system which may result from other developments than the mere growth of the population.

The overall growth of a country's population is mainly due to the natural increase resulting from the total number of births less the total number of deaths in a given period. Where there is no substantial migration of people in or out of a country, the rate of population increase may be calculated by taking the "crude birth rate" (number of births per 1,000 population) and subtracting from it the "crude death rate" (number of deaths per 1,000 population). The annual number of marriages, and the age of persons at marriage, would have an influence on the number of births to be expected. Of particular importance in estimating the number of future births is the proportion of married women of child-bearing age (say between the ages of 15 and 45 years) in the total population. Thus the use of a crude birth rate is not always satisfactory.

Similarly, the crude death rate, which is also related to the total population, conceals the marked differences in the mortality of persons in different age groups. For instance, more children by far die during their first year of life than at any subsequent age. Childhood mortality declines to a minimum perhaps around 10-14 years of age. Chances of death then increase with advancing age during the adult years. In most countries, mortality for females is likely to be lower than for males at corresponding ages. Therefore, in order to estimate the size of the future population it is necessary to take into consideration the specific rates of death for each sex and at each age.

For the purpose of estimating future school enrolment, special attention must of course be given to the population in the school-going ages. There is no uniform definition of the school-age population for all countries. This depends for each particular country partly on the legal age limits of compulsory education (if there is compulsory education) and partly on the structure of the school system, in terms of the usual age at entrance and the duration of each level of education (whatever may be the legal requirements for compulsory education).

In countries or in areas where there is considerable in- or out-migration, allowance must be made for the number of persons, especially the number of children of school age, who may be included among the migrants. Sometimes it may be necessary also to take into consideration the number of children expected to be born of persons migrating in or out of the country or area for which we are to estimate future school enrolment.

We shall now briefly mention some of the non-demographic factors which have a bearing on the size of the future school enrolment. In a country where education is not compulsory by law, or where legal provisions for compulsory education are not fully carried out, the number of children attending school will depend, among other things, on the choice and convenience of parents, the availability of school facilities, and the possibilities of employment for children and for adults with varying amounts of schooling. Any attempt on the part of a government to introduce or more fully to enforce compulsory schooling will obviously bring about a higher level of school enrolment or school attendance. If compulsory schooling were to be extended by raising the legal school-leaving age, or if there were a tendency for children to remain in school longer than they are required by law, the size of school enrolment could change very substantially as a result.

In many developing countries the proportion of girls attending school is consistently lower than the proportion of boys. More emphasis on the education of girls would naturally increase the total number of children enrolled in school. Similarly where school enrolment is markedly lower in rural areas than in urban areas, increased efforts directed towards rural schools could also result in greatly increasing the total school enrolment.

Two sources of wastage in school enrolment may be noted in view of their effects on the size of total enrolment. The first is the tendency, commonly found in almost all countries, for children to drop out of school before the completion of a prescribed course of study, say at the primary or secondary school level. If the drop-out rate could be reduced, that is, if the schools could keep more children in school for a longer time, or still better, if most or all of the children entering school at a given level were to remain until they complete the prescribed course at that level, the immediate effect would be to increase the total school enrolment, even if there were no increase in the school-age population or in the number of children entering school for the first time.

The second source of wastage is the very common practice, especially in the developing countries, of keeping children in the same class or grade because they fail to be promoted at the end of a school year. This requirement for children to repeat their grades, usually justified in terms of maintaining school standards, may actually be one of the causes of early school-leaving. Hence a reduction in the number and proportion of repeaters could lead to a decrease in the drop-out ratio and a corresponding increase in the total enrolment. Furthermore, a systematic reduction leading to the eventual elimination of the practice of non-promotion would have the effect of breaking a traffic jam, thus making room for more children to enter the schools and to progress regularly through the grades.

The factors mentioned above – natural increase of population, influx of migrants, enforcement of compulsory education, raising of school-leaving age, increased enrolment of girls, development of rural schools, reduction of drop-outs, elimination of non-promotion – all seem to point to an inevitable increase in total school enrolment, especially in a developing country. There are, however, some limiting factors which may tend to counteract the effects of those influences towards growth and expansion of the school system.

In the first place, an expanding school system requires an ever-increasing number of adequately trained teachers. Even if there were no increase in total enrolment, a school system must recruit new teachers every year to replace its losses due to death, retirement, change of profession, marriage of women teachers, and other causes. New and better trained teachers must be found to take the place of under-qualified members of the existing staff. If the present school system suffers from too many over-sized classes, due to a shortage of teachers, any improvement of the situation would require still more teachers. The need for additional teachers may be urgent if, as often is the case in many developing countries, double sessions of children are accommodated in the same school – for example, a morning and an afternoon session – often taught by the same body of teachers. Any increase in pupil enrolment would call for more teachers, over and above all existing needs such as those we have just described. Considering that the adequate training of teachers requires several years, there is evidently a limit to the possibility of expansion of a school system, determined by the potential supply of teachers, apart from other considerations.

Another limiting factor, so well-known and painfully felt in most developing countries that its mere mention is enough for it to be recognized, is the persistent shortage of school buildings and related facilities. The expediency of conducting double sessions in the same school has already been noted. Use of buildings unsuitable for school purposes is another common situation. Unless and until present needs for school buildings and related facilities can be met adequately, how could it be possible to envisage further expansion in terms of pupil enrolment – only to aggravate the existing problems ?

Finally, all plans and proposals for expansion of the school system must unfortunately be subject to the limitation of economic and financial considerations. To what extent can a nation's total expenditure for education be increased without overtaxing its economic resources? What share of the costs of education should be borne respectively by the public authorities, private organizations and individual citizens ? If resources are limited, what priorities should be given to the claims for development of the various levels and types of education – as for instance between primary and post-primary education ; rural and urban schools ; general and vocational education ; the preparation of teachers and of other types of professional workers ? Such questions are not easily answered, but they must be taken into consideration by the administrators and policy-makers in regard to the future development of the school system.

Thus it may be seen that there are in reality three sets of factors which mainly determine the trends of future school enrolment. We may call them the demographic, educational and economic factors. In the following chapters of the present *Manual*, we shall however confine our attention to the effects of various demographic and educational factors as they influence the growth of school enrolment. We do not mean to ignore or minimize the importance of economic factors in educational development, but it so happens that the main concern of this Manual – a methodology for estimating future school enrolment in developing countries – carries us more directly into the fields of demography and education ; further consideration of the inter-relationship between economics and educational development, including estimation of the costs of education, must await the possible appearance of another work.

2. NEEDS FOR ESTIMATING FUTURE SCHOOL ENROLMENT

Some of the very factors influencing the growth of school enrolment, as mentioned above, point up the need for carefully prepared estimates of future school enrolment. Such estimates would help to avoid the risk of unexpected surprises, haphazard guesses, or impractical policies adopted without sound bases. In short, as educational planning is essential to well-balanced economic and social development, so are estimates of future school enrolment an indispensable element in educational planning.

It may be argued that a developing country usually lacks many of the basic data required for estimating future school enrolment; consequently there are so many uncertain factors in the situation as to make any attempted estimates unreliable and largely a wasted effort. Our answer to this argument would be that the less we know of the past trends and present tendency in this essential area of national life, the more need there is for careful planning ahead, based on the best possible estimates that can be obtained. While a country relatively well-developed in education might coast along without serious consequences, a less-developed nation trying to make up for lost time can ill-afford to drift without map or compass.

In the next chapter we shall set out to examine the types of basic data required for estimating future school enrolment. Where we do not find all the relevant facts and figures readily at hand, we must resort to certain assumptions, substitutions and compromises in order to arrive at some reasonable estimates. As time goes on, and as more statistical and supporting data become available, these first estimates can be revised and brought up to date. This course of action would be more advisable than the postponement of all action because of deficiency of basic data.

Let us look more closely at the ways in which estimates of future school enrolment would be useful to those who are responsible for the administration and planning of education in a developing country.

One of the principal duties of a school administration is to provide teachers, adequately trained and sufficient in numbers, to carry on the work of teaching a whole generation of boys and girls of school-going age. A serious shortage of teachers may often be the result of failure to anticipate the growth of the school-age population. With a rapidly growing population, an ever-increasing number of teachers will be needed just to keep a country's education at the same level. If there is to be any raising of the educational level – as would naturally be the hope of any developing country – then the number of teachers must increase at a faster rate than the number of school-age children. Since teachers cannot be produced instantly on demand, the far-sighted administrator would want to know just how many new teachers must be trained in the years to come. The answer will depend in part on how many children will have to be taught. Therefore the potential school enrolment must be estimated in advance.

Similarly, the administrator would want to know how many and what kinds of schools must be built or otherwise provided. Though it would take less time to build a school than to train a teacher, still plans must be made early enough to enable budgets to be submitted and approved, funds to be appropriated and other steps to be authorized by the proper authorities. For this purpose, the future school enrolment must be estimated in some detail as to the level of education, type of school, and even the area or locality involved.

If further planning is needed in such matters as the supply of living quarters for teachers and students, transportation for pupils in rural areas, procurement and distribution of food items for school meals, printing and distribution of school books, and the provision of other essential services, then a whole series of enrolment estimates may be necessary, including the sex, age and grade level of the pupils, and other relevant details.

We have already mentioned the costs of education as a limiting factor to the development of a school system. But how is the administrator to attempt any rational costing of a school programme unless he has some estimates, however approximate, of the probable size of the school population?

So far we have only touched upon the needs of the school administrator in carrying out existing or predetermined school policies. Where a country is faced with the possibility or necessity of changes in its school policies, the need for estimating future school enrolment under various assumptions is even more obvious. In fact, the feasibility of certain changes may have to be tested first by evaluating their possible effects on the size of the future school enrolment. For example, before introducing a new law or changing an existing one on compulsory education, it would be only prudent and reasonable to find out what would be the probable size of the educational task under such a new law or amendment. This would require first an estimate or a series of alternative estimates of the potential school enrolment, depending on the type of contemplated change.

Other instances of this kind may arise in connexion with the education of girls, i.e., whether they are to be taught in separate schools or admitted to the same schools with boys, or in connexion with the establishment or expansion of schools in rural or in urban areas. Since the number of girls in the population of school age is more or less equal to the number of boys, and since the percentage of rural population in a developing country is likely to be higher than the percentage of urban population, it may be easily seen that any change in policy regarding the education of girls or the establishment of schools in rural areas must affect the total school enrolment appreciably.

Still other questions of school policy may have to do with the requirements for admission, attendance, promotion and graduation of pupils at different levels of schooling. Where there is serious wastage due to large numbers of pupils who drop out of school before completion or who repeat their grades due to non-promotion, changes in policy regarding drop-outs and repeaters could influence the size of school enrolment in one way or another.

These are some of the ways in which estimates of future school enrolment can help the school administrator or policy-maker in shaping the educational development of a country. Depending on the particular needs of the school administrator or educational planner, school enrolment may have to be estimated for a time period ranging from one year to twenty years or more. We shall now consider some of the elements involved in short-term, medium-term and long-term estimates of future school enrolment, especially for purposes of school administration and educational planning in a developing country.

3. SHORT-TERM, MEDIUM-TERM AND LONG-TERM ESTIMATES

Once it is decided that estimates of future school enrolment are needed, what is a desirable period of time for which such estimates should be made? The answer, of course, depends in part on the use to be made of the estimates. If enrolment estimates are needed for the sole purpose of preparing an annual budget of expenditures for the school system, it is probably enough to make annual estimates of enrolment one or two years in advance. If a school building programme is under consideration which would be spread over a period of a few years, then estimates of school enrolment must be prepared for several years ahead. If the question under consideration has to do with the training of teachers and related professional workers, then the period of time covered by the estimates must be at least as long as it takes to complete the training of one group of such workers. If, however, it is a question of reorganizing an entire school system, involving every level and type of education, it would seem advisable to draw up estimates of future enrolment for at least ten to fifteen years – about the length of time it takes for a pupil to progress through the school system. Finally, for the establishment or changing of basic educational policies, it may be necessary to evaluate such policies in terms of their probable effects on school enrolment for twenty years or more – the span of a whole generation of children through their formative years of adolescence and youth.

The length of time to be covered by enrolment estimates is also related to the amount and recency of basic data available to the estimator. If, for example, we have full, reliable, and up-to-date figures on births, deaths, and migration of the population over a long stretch of years, as well as data on school enrolment and attendance by sex, age and grade of pupils from census enumerations and school records for an equally long period, it would not be very difficult to attempt relatively long-term estimates of future school enrolment for the students who will be graduating from universities twenty years hence, or those who will be completing their secondary education fifteen years from now, or even most of the children coming out of the primary schools in the next ten to fifteen years are already born . In other words, we need estimated numbers of births for only a few years ahead in order to have a basic population from which to derive some estimates of future enrolment in primary schools up to ten years, in secondary schools up to fifteen years, and in higher education up to twenty years. To the extent that our basic data are incomplete or out of date, we must of course resort to making various adjustments and assumptions, whose validity may become questionable even over a relatively short period of time.

Keeping in mind that all estimates of future school enrolment, whatever the length of their coverage, are subject to varying degrees of error, we should be less concerned with the choice between long-term and short-term estimates and more concerned with the quality and adequacy of our basic data. Within the limits of our data, and by judicious use of reasonable assumptions, we may be able to prepare fairly long-term estimates as satisfactorily as those of short-term. As a matter of fact, most of the school enrolment estimates published in recent years have tended to cover periods of time ranging from ten to fifteen years – which might be called medium-term estimates. For a developing country, with the usual problems of deficient data and uncertain trends, it might be prudent for the technician to begin with estimates over a shorter period of time. With more experience and better data at hand, longer-term estimates could be attempted.

One important safeguard of a long-term estimation of future enrolment should be a built-in feature of frequent revisions, so as to reduce the margin of error by modifying the original assumptions in the light of later observations. This procedure is generally followed in work of this kind done in the more developed countries.

CHAPTER III

METHODS OF ESTIMATING FUTURE SCHOOL ENROLMENT

1. PLAN OF THIS CHAPTER

In this chapter we shall first explain some of the terms commonly used in educational statistics which are relevant to estimating future school enrolment. The reader may find some of the terms used with different meanings in different countries or by different writers, since in the field of educational statistics very little has been done so far towards standardization of terms.[1] Nevertheless, for purposes of the present *Manual* we have adopted certain terms as explained below, and trust that the reader will keep these explanations in mind when he examines the case studies presented in the following chapters.

We shall avoid as far as possible the use of purely mathematical and statistical terms. Nor shall we attempt to define or explain those demographic terms relating to population projections which fall outside the scope of this *Manual.*[2] Again, those terms which are used in educational statistics in particular countries, but are not generally used elsewhere, have also been excluded from our list.[3]

After that we shall enumerate some of the basic data needed for estimating school enrolment, with special attention to problems of collecting and compiling such data in developing countries. This will not be an exhaustive list of all types of data useful to the educational administrator or even for the purposes of educational planning in general. The interested reader is referred to other works devoted more specifically to those needs.[4]

The chapter will conclude with a summary outline of methods appropriate for estimating future school enrolment in developing countries. This outline is not necessarily applicable to every kind of situation which may be found in developing countries; but, together with the case studies presented in Chapters IV to VI and examples from selected countries presented in Chapter VII, may be useful as a guide to the technician in a developing country who may be called upon, perhaps for the first time, to provide estimates of future school enrolment for purposes of educational administration and planning in his particular country.

For those who may be interested in methods of estimating population in general, and of population projections by sex and age in particular, we refer to a series of manuals published by the United Nations, of which the following are of special relevance:

Manual I:	*Methods of estimating total population for current dates* (Population studies, No. 10);
Manual II:	*Methods of appraisal of quality of basic data for population estimates* (Population studies, No. 23);
Manual III:	*Methods for population projections by sex and age* (Population studies, No. 25).

2. EXPLANATION OF TERMS

The following terms which are relevant to estimating future school enrolment are explained as we understand them. These explanations are not intended as standard definitions, for in many cases such standardization does not yet exist and may not even be possible. The reader should be especially careful in adapting these and other terms when translating from one language to another, since the meaning of a term commonly accepted in one language may not be so clear or satisfactory when translated into another language.

When we speak of the *school-age population* we mean the total number of persons within certain age groups who are either required by law or are eligible to attend schools at a certain level. Thus we may distinguish a *compulsory school-age population* consisting of boys and girls in certain age groups who are required by law to be attending school, unless they are exempted for specific reasons. We may also speak of a *primary school-age population,* a *secondary school-age population,* or sometimes a *college-age*

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[1] See: Unesco. *Manual of educational statistics* (Paris, 1961); more particularly, "Recommendation concerning the international standardization of educational statistics," adopted by the General Conference of Unesco at its tenth session, December 1958.

[2] For statistical terms, see: Kendall and Buckland, *Dictionary of statistical terms* (London, 1957); for demographic terms, see: United Nations, *Multilingual demographic dictionary* (English, French, Spanish, and Russian sections), in Population studies, No. 29 (New York, 1958).

[3] See, however, Unesco, *Manual of educational statistics;* also glossaries under country chapters in Unesco, *World survey of education,*Vol. II or Vol. III (Paris, 1958, 1961).

[4] See, for example: Unesco. "Statistics needed for educational planning", in Economic and Social Aspects of Educational Planning.

population when we can specify the respective age limits normally associated with school attendance at these levels.

By *school attendance* we mean the actual presence of a child at school during a specified period of time, which may be a school day, a school term, a school year, a calendar year, or any other specified period. A *school year* may sometimes correspond approximately to a calendar year, but very often includes several months of two successive calendar years, as for example from September of one year to June of the following year.

School enrolment refers to the fact that a child's name is entered or remains on the rolls or register of a school as a pupil. The term is also used to mean the total number of pupils on the school rolls at a given time, or sometimes the average number of pupils enrolled during a given period such as a school year.

The proportion of children in a given age group who are attending school at a given time is expressed by a *school attendance ratio.* The number of pupils enrolled in school, at a given level of education, related to a relevant school-age population, is called a *school enrolment ratio.* These ratios are generally stated as percentage ratios, as for example, the percentage of seven-year children attending school, or the number of pupils enrolled in primary schools per 100 children in the population 5 to 14 years of age.

We shall have occasion to compute separate enrolment ratios for each segment of the school-age population, as for example, a *primary enrolment ratio* giving the number of primary school pupils per 100 children of primary school age; a *secondary enrolment ratio* relating pupils enrolled in secondary schools to the secondary school-age population, and so forth. For international comparisons Unesco has recommended that a primary enrolment ratio be related to the population aged 5 to 14 years inclusive; a secondary enrolment ratio be related to the population 15 to 19 years inclusive; and a *total enrolment ratio* be related to the population aged 5 to 19 years inclusive.

We speak of three *levels of education* - first, second and third - by which we classify different types of schools. Thus we designate as the *first level of education* that which is usually provided in primary or elementary schools, sometimes including kindergarten or infant classes. Secondary schools providing general , vocational or technical instruction or specialized training for teachers are classified as the *second level of education.* Intermediate schools are sometimes included with schools at the first level, but may also be classified as the lower stage of the second level. Teacher training schools above the second level, as well as general, technical and professional education, which require the completion of a second-level education as a condition for admission, are considered to be at the *third level of education.*

Depending on the controlling authority we distinguish between *public schools,* which may also be called government schools, and *private schools,* sometimes called non-public or non-government schools. This distinction is not always easy to maintain because there are different degrees of control, both administrative and financial, exercised by public authorities of different countries over different types of schools at each level of education. In practice, some classification along these lines is usually possible for any individual country, though it may not agree with the classification in another country.

Returning to the school-age population, the *age* of a person may refer to age in completed years, sometimes called age at last birthday; or to age in rounded years, sometimes called age at nearest birthday. An *age group* may refer to all persons at the same single year of age, such as the seven-year-olds; or it may refer to all persons included within specified age limits, such as from ten years up to under fifteen. In the latter case we would designate the group as aged 10-14 years (inclusive). When we speak of the *median age* of a group of pupils we refer to that age which divides the group of pupils into two equal halves, one half of the group being above, and the other half being below the median age.

Pupils at the first and the second levels of education are generally classified by *grade* or *year of study.* (In some countries they are called classes or forms; they may be numbered from the lowest to the highest, or sometimes from the highest to the lowest). We shall generally number the grades from the lowest to the highest, within each level of school. The *median grade* of a group of pupils refers to that grade which divides the group into two equal halves, similar to the idea of the median age.

A *cohort* - a term most commonly used in demography - means group of persons experiencing a certain event in a specified period of time. Thus an *age-grade-cohort* refers to children of the same age entering the same grade during a given year. A *grade cohort* means a group of pupils, regardless of age, entering a certain grade at school during the same year. When we follow a given cohort of pupils through successive grades, to find out how many of them remain in school after so many years, this is called a *cohort-survival* analysis.

Grade progression refers to the course of pupils progressing from any grade to the next higher one. This is usually accomplished by means of *promotion* at the end of a school year. Pupils not promoted are expected to repeat the same grade the following years; they are called *repeaters*. Pupils who leave school before completing the full course of study at a specified level are counted as *drop-outs*; they may have dropped out during a school year or between school years.

The proportion of pupils who progress regularly from one grade to the next, as related to the original grade cohort, is called the *grade progression ratio.* The proportion of pupils who fail to make regular progress from one grade to the next is sometimes called the *grade attrition ratio.* The proportion of pupils who repeat a specified grade is similarly called the *repeater ratio.* When the repeater ratio is added to the grade progression ratio, we have the *grade retention ratio* which is the number of pupils in a higher grade (including repeaters) compared to the number of pupils in the next lower grade of the previous school year. When all the repeaters in the different grades from an original cohort are added to the number of pupils who have progressed regularly through all the grades of a specified level of school, and the resulting number is related to the original grade cohort, we obtain the over-all *school retention ratio*, which measures the holding power of the school over a group of pupils starting out together in the lowest grade.

All these ratios concerning school progression and retention are computed as percentage ratios. When the experience of several grade cohorts is pooled by averaging their respective ratios, we obtain average grade retention or school retention ratios. These ratios may then be used as basis for estimating future school enrolment.

A cohort of new pupils in the beginning grade of a school level is called the *intake* of that school level. When the intake is compared to a group of persons eligible for entering that school level, we have an *intake ratio.* Similarly, the group of pupils who complete a given course at a specified time constitute the *output* of that school level; and an *output ratio* is obtained by relating it to the intake at the beginning of the same course. The intake and output ratios are also generally given as percentage ratios.

Another kind of ratio is computed when we divide the total pupil enrolment at a specified school level by the total number of teachers at that school level. Thus we obtain a *pupil-teacher ratio*, which is of course not a percentage ratio, but expresses the average number of pupils enrolled per *teacher in service.* This is not to be confused with the average size of a class taught by one teacher. The latter may be, and often is, higher than the pupil-teacher ratio, since part-time teachers and school principals who do not teach classes are usually included in the number of teachers in service. Administrative and supervisory staff, as well as various types of auxiliary personnel, should in principle be excluded from the number of teachers in service when computing pupil-teacher ratios. Similarly, *teachers in training* such as student teachers should also be excluded. The number of students completing their courses in teacher training schools in a given year constitute the *teacher output* for that year. The number of *new teachers* required for a school system in a given year should be enough to take care of increases in total pupil enrolment as well as needs for the replacement of teachers who are lost through death, retirement, resignation, change of occupation and other causes.

It may be useful at this point to explain a few other terms which we are going to use in the following chapters - terms which are somewhat technical in nature, applicable not only to school enrolment estimates but to statistical analysis and estimation in general.

When we say *observed data* we mean statistical data, such as number of children attending school, pupil enrolment , number of teachers in service, resulting from actual counts made by census enumerators or taken from school records. They are presumably complete and accurate, even though they may not be entirely up to date. For up-to-date figures we may have to resort to some estimation, in order to fill in the gaps where needed data are missing. Such *estimated data* are of course subject to error; hence they should be clearly marked as estimates. If we have sufficiently complete and reliable observed and estimated data for a number of years up to the present, we may try to discover any consistent and reasonable *trends,* as for example in the growth of pupil enrolment, at each level and for each type of school. Such *rates of growth* are usually expressed as annual rates, and may be averaged over a number of years.

Before we can estimate future school enrolment, we must make some *assumptions*, or guesses, concerning future trends. Will the growth of enrolment continue at the same rate as in the past? Is it more likely to grow at a faster rate? Or would it be more reasonable to assume a slowing down in the rate of growth? Similarly, for example, assumptions have to be made concerning future trends in grade progression ratios, repeater ratios, school retention ratios; distribution of pupil enrolment between public and private schools, between urban and rural schools; future trends in girls' enrolment as compared to boys', second-level as compared to first- level, vocational as compared to general enrolment; and the like.

When we can base our assumptions concerning future trends rather solidly upon observed trends in the past, with suitable modifications where necessary, we can speak of making *projections.* On the other hand, where we have not discerned clear trends from observed data, or where we are unable to make definite assumptions concerning the future, we shall nevertheless do our best to make some *estimations* based on such data as we have and such assumptions as we can justify.

This leads us to the question of *errors*. It is of course well known that all statistics, with the best of intentions, will always contain errors. Some errors, such as those due to *rounding*, are generally inconsequential. Other errors, such as those due to faulty observation, reporting or recording, can be serious and should certainly be avoided or corrected wherever possible. But the *errors of estimation* are inherent in the process, and therefore unavoidable. It is only necessary that every precaution be taken to minimize the errors of estimation, without being afraid to make any estimates for fear of errors.

With these words of explanation concerning our terminology and our general approach to the subject, we shall now proceed to specify the kinds of basic data which would enable us to make some meaningful and reasonable estimates of future school enrolment in developing countries.

3. BASIC INFORMATION REQUIRED

In order to estimate future school enrolment, we need at least four general types of basic information. The first relates to the population of school age, the second to pupil enrolment, the third to various rates and ratios derived from the first two types of data, and the fourth to questions of administrative policy affecting education in general and school enrolment in particular.

Before we can have any idea as to how many pupils will be enrolled in school at any given time in the future, we must first ask: How many children will there be who will be eligible to go to school? Where education is compulsory by law, the question becomes: How many places must be provided in the school system if all children required to attend school are to be accommodated? In addition, how many more children below or above the ages of compulsory schooling will have a right to ask for admission to the schools of the country? We therefore need to know the probable size of the total school-age population for such periods of time as we are required to estimate the future school enrolment.

Thus we must have future population estimates by age, covering not only the period of compulsory schooling but the whole span of years which a child may spend in schools at different levels of education. Let us say we are interested in all levels of education, from the pre-school to the university. The full span of years that may be spent by a person in acquiring a complete formal education could extend from the age of 2 or 3 years up to say 30 years and over. Within this span certain age groups may be associated with each level of education, as for example: pre-school, 2-5 years ; first level, 6 - 13; second level, 14 - 17; third level, 18 and over, in accordance with the particular organization of the school system. If our concern should be limited to the first and second levels of education, we may need estimates of population within a narrower range of ages, say from 5 or 6 up to 18 or 19 years. It would be useful, though not absolutely essential, that we have these population estimates by single years of age, and if possible, separately for each sex. For example, we could have population estimates for five-year age groups, as is commonly done in many countries: 0 - 4, 5 - 9, 10 - 14, 15 - 19, and so forth. Since these age groups rarely correspond to specific levels of education, a method will be introduced in this *Manual* for obtaining, by interpolation, population estimates for suitable age groups derived from the data given in the standard five-year age groups.

Again, it would be useful, but not essential, to have future population estimates for each year for which we are to estimate the future school enrolment. More commonly we would find future population estimates given at five-year or ten-year intervals, as for example, for 1965, 1970, 1975, 1980, and so forth; or simply for 1960, 1970, 1980, and so forth. In such cases, we could also derive by interpolation approximate estimates for the years in between, such as 1966, 1967, 1968, 1969, and so forth.

If estimates of future population are not available, we may have to construct those before we can begin or complete our estimates of school enrolment. Methods of estimating future population, based on assumed rates of birth, death and migration, are explained in other works, to which the interested reader is referred.[1] In the present *Manual* we shall assume that estimates of future population, at least in five-year age groups, say from 0 to 29 years, are either available or may be constructed for the purpose.

The second type of information necessary for estimating future school enrolment relates to past and present figures on the number of pupils enrolled in schools at each level and for each kind of institution. In an ideal situation, we should have pupil enrolment data by sex, age and grade (year of study) for as many years as possible up to the current school year. These data should cover both public (government) schools and private (non-government) schools. They should also distinguish between enrolment in different kinds of schools at each level, especially at all levels above the first (primary or elementary) level. Where it is important, separate enrolment figures should be available for schools in urban and in rural areas. Enrolment figures for each province or district would also be useful; they are of course essential if estimates of future enrolment are to be made separately for each of these areas.

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[1] See United Nations manuals on population estimates, more particularly, Manual III: *Methods for population projections by sex and age* (Population studies, No. 25)

In addition, we should have the number of pupils who drop out of school each year and of those who have to repeat their grades due to non-promotion. At the end of each level of school (first and second) or of each stage of instruction (elementary, intermediate, junior secondary, senior secondary) account should be taken of the number of pupils who complete successfully that level or stage, by examination or otherwise. At the beginning of each level or stage, a count should be made of all new admissions each year - that is, of all pupils who had not previously been admitted to any school at that level or stage.

All such detailed information concerning pupil enrolment, from their first admission to a school until the completion of their course, is important for many administrative purposes; it is quite essential for the purpose of providing a sound basis for estimating future school enrolment. This will become clear when we proceed with our explanation of the methods for obtaining such estimates. These methods, in one way or another, will involve the computation of various rates and ratios, to which we shall now give our attention. They are the third type of basic information needed for our purpose.

If the question of school attendance is included in a census of population, as is the practice in many countries, we obtain the number of persons at each age who claim to have attended school during a certain period of time up to the date of the census. If we divide the number of persons thus reported to have attended school by the total number of persons at that age, we obtain a school attendance ratio specific for age, or specific for sex and age.

A variation of this measure, which we shall call the school enrolment ratio, is obtained by taking the number of pupils of a specified age enrolled in school (as reported in current school statistics) and dividing it by the estimated number of persons at that age. Due to the difference in time reference and in the source of information, the resulting ratios do not have the same meaning. The major advantage of the school enrolment ratio, however, is that it can be easily obtained from regular school enrolment reports, without the necessity of a census enumeration or a household survey.

Where school enrolment is not reported by age, a useful ratio can be computed by relating the total enrolment of a school level, such as primary schools, to the estimated population of an appropriate age group, such as 6 - 12 or 7 - 13 years. The resulting ratio in this case may be called a primary school enrolment ratio, but it will not be an age-specific ratio, because the ages of the children enrolled in school do not necessarily correspond to those included in the population group.

When we have comparable school attendance or school enrolment ratios for two or more years, we can compute annual rates of change (increase or decrease) of the ratio. If the data are separated by several years, an average annual rate of change may be computed.[1] Such a rate , if based on original data of good quality, has the advantage of taking into consideration at the same time the rate of population change as well as the rate of growth in school enrolment.

One of the useful measures which may be derived from enrolment data by sex, age and grade is the median age of pupils by grade. When compared to the normal age of pupils for each grade, this gives an indication of the average amount of school retardation in terms of the chronological age of pupils. Another approach to this measure is by computing the percentage of pupils above normal age for each grade.

Where enrolment data are distributed by age and by grade, for a given level or type of school, but are not cross-tabulated in a two-way distribution, it could still be useful to compute the median age and the median grade of pupils in order to get an over-all view of the distribution of pupils within the same level or type of school. An uneven distribution in one or both respects may be the result of either a rapid increase in the number of new admissions or a substantial amount of retardation, or both. Further analysis with additional data would be necessary to isolate the influence of these two factors.

An essential step in the analysis of basic data on school enrolment is to discover how a cohort of pupils progress through a school system in the course of a given number of years, under prevailing conditions of admission, promotion, dropping out, repetition,and graduation. Thus we need to compute such measures as the intake ratio, grade progression ratio, grade attrition ratio, repeater ratio, grade and school retention ratios, culminating in the output ratio. These various ratios should be computed for a number of years, in order to identify any trends which may be taken into consideration in estimating future enrolment.

Although we are not directly concerned here with the whole problem of estimating teacher supply and demand, it would still be useful and sometimes necessary to enter into this area in order to estimate future enrolment in teacher training schools. For this purpose, we should have past and current data on the number of teachers in service, average pupil-teacher ratios, and the annual number of teachers leaving the service (through death, retirement, resignation, change of occupation and other causes), as well as the number of teachers in training and the annual output of the teacher training institutions.

We have spoken of the various types of data which should be available under ideal conditions.

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[1] For a discussion of this topic, see: Unesco, *World survey of education,* Vol. II, Chapter III (Paris 1958).

Unfortunately, conditions are not always ideal, in any school situation, especially in a developing country. What if we do not have the desired kinds of information, adequate in amount, detail, completeness, recency and comparability?

Obviously we have to come to terms with the realities of the situation, and be ready to settle for less than the ideal. Where certain kinds of data are just not available, we could to some extent compromise by substitution or adaptation, with full realization that the quality of our results might not be up to our expectations. For instance, if our basic data on school-age population are available without distribution by sex, and we need to estimate future enrolment separately for each sex, perhaps we could find an approximate sex distribution of the school-age population from another country fairly similar otherwise in demographic characteristics.

Again, if we should have enrolment data concerning all public schools but only incomplete information relating to private schools, we would not give up our job until we have at least tried to estimate the missing data on private schools with the help of any clues which we may find from other sources. Or, if enrolment data by age are not obtainable, but we do have figures on enrolment by grade (which is very often the case in developing countries), let us proceed with our analysis and our estimation in terms of broad age groups, or simply by school levels, and wait for the time when our school authorities will realize the importance of collecting enrolment figures by age of pupils.

The reader will find many instances of assumptions made necessary due to missing data, in the three case studies presented for illustrative purposes in the following chapters, as well as in the additional examples from more developed countries given in Chapter VII of this *Manual*. What we wish to emphasize is that the need for estimating future school enrolment, with or without all the necessary basic data, is often more urgent precisely in those situations where we cannot expect to have all the desired figures at our disposal. Hence we can hardly do less than make the best attempt possible to meet the need.

We now come to the last category of basic information required for estimating future school enrolment. We refer here to questions of policy objectives rather than facts and figures. These are questions on whose answers will depend the validity and efficiency of the estimates, since they can affect fundamentally the extent, direction, and speed of the development of education, of which future school enrolment is only one of the quantitative manifestations.

For example, we need to know if there is to be any change in law or in public policy regarding such matters as the following:

(a) Introduction or enforcement of compulsory education;
(b) Prolongation, if any, of the length of compulsory schooling;
(c) Equality, or otherwise, of educational opportunities for boys and girls;
(d) Respective roles of government, religious organizations and other non-governmental bodies in the future development of school education;
(e) Future emphases on the relative development of schools in urban and rural areas;
(f) Future emphases on the relative development of education at the different levels: primary, secondary, and higher;
(g) Future emphases on the relative development of different types of formal education: general, vocational, technical, professional;
(h) Increase or decrease in the average class size or pupil-teacher ratio;
(i) How to deal with the problems of drop-outs or premature school-leaving;
(j) How to deal with the problems of repeaters due to non-promotion of pupils;
(k) How to increase the intake and output of schools at each level, in accordance with the needs for educated manpower;
(l) Provisions for the preparation of qualified teachers to meet the needs of a development school system;
(m) Provisions for the building of additional schools, classrooms, and other facilities;
(n) Possibilities of financing a developing school system - and especially limitations thereof.

In short, if estimates of future school enrolment are to be valid and efficient for purposes of educational planning, they must be realistically based on the most probable course of the future development of the school system for which the plans are being laid. In other words, the statistician who is to provide the enrolment estimates can function most effectively when he is a member of the team responsible for the process of development planning.

4. OUTLINE OF METHODS

Assuming that the statistician has the mandate to prepare some estimates of future school enrolment, say for a period of ten, fifteen or twenty years; and assuming that he has as far as possible the types of basic data and other information necessary to guide him in making such estimates, we shall now set down briefly an outline of methods which he could follow in carrying out his task.

First we shall distinguish between two principal approaches to the problem - one of which is based primarily on the level of current school enrolment and estimated ratios of intake, retention, and output of the school system; the other depends more directly on estimates of future school-age population and future school attendance or enrolment ratios. For convenience we shall call the first approach the " grade-cohort method " and the second approach the " enrolment-ratio method ". We shall see that the two approaches are not mutually independent of each other.

In general, the grade-cohort method may be used to advantage when we have fairly complete and detailed school enrolment data by sex, age and grade, or at least by sex and grade, for a sufficient number of years. The number of years covered by these data should be at least equal to the number of grades at each level of education, preferably several years more. If, in addition, we have data on promotions, drop-outs and repeaters for each grade, also for a sufficient number of years, it would greatly facilitate our work by the use of this method. Finally, some current and future estimates of school-age population by sex and age would be needed to complete our estimates of future school enrolment.

Where current school enrolment data are not available in such detail, but school-age population by sex and age may be obtained from recent censuses and current estimates, we could use the enrolment-ratio method for some approximate estimates of future school enrolment. Especially if a question on school attendance has been included in two or more census enumerations or household surveys, such data could serve as the starting point for future enrolment estimates. They could then be completed with the help of available data on school enrolment from current reports.

Thus we find that either approach requires the use of both population and enrolment data. In fact, if we had adequate data on population and enrolment, and tried both approaches, we should in principle arrive at fairly comparable results.

Regardless of which approach we use, there are three logical stages which it would be advisable to follow in our work:

(1) We analyse our available data to bring out basic characteristics and trends, which must be taken into consideration when we proceed to make our estimates of future school enrolment. It is at this stage that we find out, for instance, if our total school enrolment has been growing, and at what rate; how it is distributed by level of education and by type of school; what is the proportion of boys and girls in the total enrolment and at each level of education; what part of the enrolment is attributed to public and to private schools; how does the extent and rate of growth of rural school enrolment compare with that of urban schools; and so forth. We also compute the various appropriate ratios based on the existing data: ratios of grade progression, drop-outs, grade retention; intake and output ratios at the different levels; pupil-teacher ratios; and the like. We would also make use of population estimates by age groups and compute enrolment ratios and their rate of change. Some of this analysis may of course be carried out as we proceed with our next stage, which is the estimation of future enrolment, but it would seem preferable that we anticipate our needs for the various measures and have them prepared before we start on our estimation.

(2) Our second stage will be to make our estimates of future school enrolment based on available data, more or less digested in the course of our preliminary analysis. The steps to be followed in this stage will depend on our choice of method and also to some extent on the results of our preliminary analysis. In other words, we shall carry our analysis further, in order to move forward from our base year to our target years. Sometimes it may be advisable first to make some provisional estimates, in order to have an idea of the general order of magnitude. If we are satisfied with the look of things at this point we may go on to make more refined or more precise calculations. Otherwise this pause would give us an opportunity to re-examine our data and our assumptions and see where we may have to introduce some necessary modifications. As we proceed with our estimation, we shall be watching for any inconsistency in our results - inconsistency within the same set of figures or between one set of figures and another. Finally we assemble our figures, draw up our tables, and perhaps embody our results in one or more graphic charts.

(3) Our third and final stage will consist of the checking of our estimates by bringing together observed data for past years and estimated data for future years; enrolment figures for different levels of education and types of schools; population figures by sex and age; in short all the related elements which have gone into the making of our estimates. In this way we can satisfy ourselves as to the consistency of our data, the reasonableness of our assumptions, and possibly the accuracy of our computations.

Perhaps we should mention here that there are two more stages to our work after our estimates are completed and accepted, or even after they are published in official documents. When sufficient time has elapsed after our estimates are made and more up-to-date figures on population and on school enrolment become available, we should take up our estimates and re-examine them in the light of the additional data and of our further understanding of the problems. Revisions may then be introcuded, so that any major errors would not be perpetuated.

Finally, after the passing of the first or some of our target years, we should compare our estimates with the actual school enrolment of that year or of those years and see how closely we have been able to approach the reality with our estimates. This may be a source of satisfaction (if we have come reasonably close) or cause for embarassment (if, as is likely to happen, we shall have missed the mark by a more or less wide margin). In either case, we shall be wiser by that time, and better prepared to embark on our next project of this nature.

We shall conclude the present chapter by summarising the various steps in the procedure for estimating future school enrolment, in a hypothetical situation, by the use of: (A) the grade-cohort method; and (B) the enrolment-ratio method. Where appropriate, reference will be made to the illustrative case studies presented in the next three chapters or to the examples given in Chapter VII.

(A) *The grade-cohort method*

Sometimes known as the "cohort survival" method, this requires data on pupil enrolment by grade for at least as many years as the number of grades at the given school level; if possible also the number of new pupils and repeaters by grade. Separate figures by sex are usually desirable; by public and private schools, and by urban and rural areas as far as possible. The following steps are suggested:

(1) Assemble all available data and analyse them for any characteristic trends.

(2) If enrolment data include number of new pupils and repeaters by grade, compute grade progression ratio, repeater ratio and grade retention ratio between grades 1 and 2, between grades 2 and 3, and so on. (See Chapter IV, tables IV-11, IV-12, and IV-13).

  (a) If enrolment is reported without separate numbers of new pupils and repeaters, approximate grade retention ratios may be computed. (See Chapter IV, table IV-20; Chapter VI, table VI-14.)

  (b) If there are no repeaters, or if the number of repeaters is known to be negligible, the grade progression ratio may be considered as equivalent to the grade retention ratio. (See Chapter VII, table VII-13.)

(3) When grade retention ratios have been computed for a number of years, they should be examined for trend. If no clear trend is discernible, the ratios may be averaged over a number of years. (See bottom lines of table IV-13.)

  (a) If a clear trend is shown, as for example, where the grade retention ratio between two successive grades is consistently rising, due to the reduction in the number of drop-outs, then the yearly ratios should not be averaged. In such case, the observed trend should be taken into consideration when projecting this ratio into the future.

  (b) Where grade retention ratios for male and female pupils are found to be quite different, separate computations and estimates should be carried out for each sex. Where there is no significant difference between the sexes, much work can be saved by using combined ratios for the two sexes together.

(4) When the grade retention ratios from the first to the last grade of the given school level are compounded, that is, multiplied together one after the other, approximate school retention ratios may be obtained. Such ratios can refer to the retention in school of a beginning cohort of pupils after one year, after two years, and so on, until they have all left the school by dropping out or by completing the final grade.

  (a) A more refined method of computing school retention ratios, by following a first-grade cohort through all the grades, with the help of appropriate grade progression and repeater ratios, is explained and illustrated in Chapter IV.

  (b) Where information on drop-outs and repeaters is lacking, only approximate ratios can be computed with the help of various assumptions, as illustrated in Chapter VI.

(5) After the yearly and average grade retention ratios have been computed, we must make some assumptions as to the ratios which will probably be obtained for future years. In a developing school system, we would expect - at least hope - that the grade retention ratios would continually improve till they come as closely as possible to 100 per cent. (See Chapter IV, tables IV-23 and IV-28.)

(6) From these assumed grade retention ratios, hypothetical school retention ratios may be computed, to give the percentage of pupils from each grade 1 cohort who may be expected to remain in school after one year, two years, and so on. (See Chapter IV, tables IV-24 and IV-29.)

(7) Now it will be necessary to estimate the size of future cohorts in the beginning grade. This may be done by observing the rate of growth of past cohorts, and estimating future cohorts by assuming a hypothetical rate or annual amount of increase. (See Chapter IV , tables IV-22, IV-25, IV-27 and IV-30.)

  (a) Where estimates of population in appropriate age-groups are available, the beginning cohorts may be estimated by means of an intake ratio based on past observations, assumed either to increase or to remain unchanged. (See Chapter VI, table VI-15.)

  (b) Beginning cohorts for higher levels of schools may be estimated from observed intake ratios based on the relationship between the last grade of the lower school and the first grade of the higher school. (See Chapter VI, tables VI-17 and VI-19, Chapter VII, table VII-15.)

(8) By applying assumed school retention ratios to the estimated beginning cohorts for the future years, estimates of total enrolment are obtained. (See Chapter IV, tables IV-22, IV-25, IV-27, IV-30;

Chapter VI, tables VI-15, VI-17 and VI-19.)

(a) Sometimes it may be convenient to depart from the grade-cohort method and to estimate total enrolment at one level (for example, second level - teacher training) from the estimated enrolment at another level(for example, first level - primary schools). (See Chapter IV, pages IV-56 to IV-63.

(b) A short-cut method may also be used to estimate enrolment in one type of school from estimates already made for another type of school. (See Chapter IV, table IV-31, where vocational school enrolment is derived from estimates of enrolment in general secondary schools and teacher training schools.)

(9) Separate estimates for urban and rural schools may be obtained from estimates of total enrolment by assuming certain proportions between urban and rural schools, based on past observations. (See Chapter IV, table on page 49; also Chapter V, table V-19.

(a) Similarly, if desired, separate estimates for public schools and private schools may be derived from estimates of total enrolment by assuming certain proportions in the future distribution of total enrolment between public and private schools. (See Chapter V, table V-20.)

(10) As a last step, it is suggested that all estimates of future school enrolment should be tested for their consistency and reasonableness, by examining them together with observed enrolment data for past years, and with population estimates for appropriate age groups. (See the last sections of Chapters IV, V, and VI.)

(B) *The enrolment-ratio method*

This method, based essentially on the projection into the future of past and current ratios of school enrolment or of school attendance, requires estimates of population by age and sex, and either school attendance data (from census and surveys) or school enrolment data (from current school statistics), also by age and sex. Enrolment data by level of school are always necessary; additional information on distribution by grade is desirable, as well as distribution by urban and rural schools, by public and private schools, and by different types of schools at each level. The following steps are suggested:

(1) Assemble all available data and analyse them for any characteristic trends.

(2) Determine appropriate age-groups for each level of education, and make first approximate estimates of school-age population according to these age-groups. (See Chapter V, table V-10.)

(a) Where population estimates are given in two or more series, such as "high", "low" and "medium" estimates, it may be decided at this point whether school enrolment estimates should also be made in alternative series correspondingly.

(b) In view of the uncertainties involved both in the estimation of population and of school enrolment, especially in a developing country, it would seem advisable to save time and effort by choosing only one series of population estimates, and to prepare only one set of estimates for school enrolment.

(3) Since population estimates are usually prepared for five-year age-groups, rather than for single years of age, it would be necessary to derive estimates of school-age population, in appropriate age-groups, by means of interpolation.

(a) A method of interpolation used by some demographers, based on an arbitrary set of weights, known as "Sprague's multipliers", may be applied to split up estimates in five-year age-groups into single-year-of-age estimates and then recombine them into the desired age-groups. (This is illustrated in Chapter V, tables V-12, V-13 and V-14.)

(b) The "Sprague's multipliers" may be adapted to obtain estimates of the population in the desired age-groups without first splitting up into single-year-of-age estimates. (This is illustrated in Chapter V, table V-15.)

(4) Where future population estimates are given only at intervals of several years (say at five-year intervals), and if estimates of school-age population are required for intervening years, further interpolation is necessary. This operation may be performed on estimates of the school-age population at five-year intervals, resulting from the previous step.

(5) Assume school attendance or enrolment ratios for each sex and age-group, based on past observations, to be applied to estimated population for future years.

(a) In a developing country, the goal will be to increase the ratios as rapidly as possible, so that nearly 100 per cent of the primary-school-age population will eventually be enrolled in school; the practical goal of maximum enrolment may be 98 or 99 per cent instead of 100 per cent. (See, for example, projected enrolment ratios for the United States, in Chapter VII, table VII-5.)

(b) The projection of school enrolment ratios for specified age groups may be done graphically, according to certain assumptions. (See, for example projections of school enrolment ratios for France, in Chapter VII, charts VII-4 and VII-5.)

(6) Multiplication of estimated future population by age-groups by the assumed enrolment ratios for the corresponding age-groups will produce the number of children expected to be in school at given dates in the future. (See Chapter V, table V-17.)

(a) Where possible, the estimated enrolment for each age group should be distributed by school level, alloting appropriate percentages, for example, to kindergarten, primary and secondary grades. (See Chapter VII, table VII-6.)

(b) Where it is not possible to make such distribution by detailed age-groups, an overall distribution of estimated total school enrolment may be made between the first (primary) and second (secondary) levels. (See Chapter V, table V-18.)

(7) If required, the estimated total enrolment in primary schools may be further distributed between urban and rural areas, in accordance with observed trends and desired goals. (See Chapter V, table V-19.)

(8) Similarly the estimated total enrolment at the second level may be distributed between general and vocational schools (and teacher training schools, if they exist at that level). (See Chapter V, table V-21.)

(9) Where appropriate, the estimated enrolment at each level may be distributed between public and private schools. (See, for example, Chapter VII, table VII-7.)

(a) If no clear trends are shown by past data, and the direction of future development is uncertain, alternative estimates may be made by using different assumptions. This applies also to the other types of distribution, such as urban-rural, or general-vocational. (See Chapter V, table V-20.)

(10) Finally, all estimates of future school enrolment, by sex, age, level and type of school, should be tested for consistency and reasonableness. (See the last sections of Chapters IV, V, and VI).

It should be emphasized that the outline of methods given above, and especially the suggested step-by-step procedure, must be adapted to the actual situation as to the availability of data, the amount of detail required, and the degree of approximation that would be considered satisfactory. They are illustrated in the three case studies presented in Chapters IV, V, and VI, to which reference has been made in this Chapter.

Further suggestions concerning methods and procedures may be found in Chapter VII, which gives some examples of actual work in several of the more developed countries. Special attention of the reader is called to the outlines of procedure given in connexion with the work of the United States Office of Education (See Chapter VII, page 120) the Southern Regional Education Board (See Chapter VII, page 129) and the New Zealand Department of Education (See Chapter VII, pages 141 and 142).

CHAPTER IV

ESTIMATING FUTURE SCHOOL ENROLMENT FOR COLOMBIA, 1961-1981

1. NATURE OF THIS CHAPTER

This chapter will be in the nature of a case study, to illustrate the method of estimating future school enrolment by means of school retention ratios. The study will be based on actual data available for Colombia, covering mainly the years from 1951 to 1960. A preliminary analysis of these data will be made to ascertain relevant characteristics and trends of educational development in this country over the past decade. Detailed operations will be shown for the calculation of school retention ratios in primary schools and in general secondary schools. Estimates will be made on the probable enrolment of pupils in these schools for each of the years 1961-1965, and at five-year intervals from 1966 to 1981. Approximate teacher requirements for primary schools over these periods of time will be estimated in order to provide a basis for estimating the future enrolment in teacher training schools. Vocational school enrolment will be roughly estimated from trends of the recent past. These separate estimates will then be combined to provide a reasonable perspective of future school enrolment in this country over the next twenty years. Finally, with the help of available estimates of the future population in the relevant age groups and other pertinent data, the enrolment estimates will be tested for their consistency and reasonableness.

Previous work in estimating the future enrolment in the primary school of Colombia, for the period 1960 to 1970, has been done by the Secretariat of the United Nations Economic Commission for Latin America and published in 1962, in a paper entitled, *Some aspects of population growth in Colombia.*[1] Still earlier, an official study on educational development in Colombia, during the period 1945/1946 to 1953/1954, was made under the auspices of a government commission and published in a volume entitled, *Estudio sobre las condiciones del desarrollo de Colombia.*[2] These, and other official documents of the United Nations and the Government of Colombia, have been very useful in the preparation of the present study. It must be emphasized, however, that the methods used, and the results obtained in the present study are only intended for illustrative purposes and do not imply any official endorsement either by the Government of Colombia or by the United Nations.

2. ANALYSIS OF BASIC DATA

Current statistics on education in Colombia are compiled by the Ministerio de Educación Nacional and published extensively in the *Anuario general de estadística,*[3] under the auspices of the Departamento Administrativo Nacional de Estadística, as well as in special bulletins devoted to educational and cultural statistics. They are also found in summary form in the various volumes of the *World survey of education,* published by Unesco.[4]

Future population estimates for Colombia, by sex and age, covering the period 1950-1980, based on three alternative assumptions, may be found in the United Nations publication, *The population of South America, 1950-1980.*[5] However, for technical reasons, we have preferred to use a set of population estimates, separately for the urban and rural populations, prepared at a later date by the Secretariat of the Economic Commission for Latin America.[6]

We shall now make a preliminary analysis of some of the basic data available from these sources, in order to prepare the ground for making estimates of future school enrolment in Colombia, covering the period from 1961 to 1981.

We first note, from table IV-1, that total school enrolment in this country had practically doubled between 1951 and 1960. In fact, the increase in enrolment at the second level was more than twofold, with the teacher training schools showing the most rapid rate of increase, followed by the vocational secondary schools and then the general secondary schools. If we consider the primary schools only, for which we have a longer record available, covering the period from 1946 to 1960, we find the most rapid rate of increase among the private urban schools, followed by the public urban and the private rural schools, with the public rural schools lagging somewhat behind in its rate of growth, as may be seen from table IV-2.

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[1] United Nations. Economic Commission for Latin America. *Some aspects of population growth in Colombia* (doc. E/CN.12/618; 10 November 1962).

[2] Colombia. Comite Nacional de Planeación. Misión «Economía y Humanismo». *Estudio sobre las condiciones del desarrollo de Colombia* (Bogotá, 1958).

[3] Colombia. Departamento Administrativo Nacional de Estadística. *Anuario general de estadística, 1951/52-1960.* Bogotá, 1954-1962.

[4] UNESCO. *World survey of education,* Vol. I (general); Vol. II (primary education); Vol III (secondary education). Paris, 1955, 1958, 1961.

[5] United Nations. *The population of South America, 1950-1980* (Future population estimates by age and sex, Report II, doc. ST/SOA/Series A, Population studies, No. 21). New York, 1955.

[6] United Nations. Economic Commission for Latin America. *Proyección de la población urbana, población rural y fuerza trabajadora* (Secretariat working paper, 5 April 1960).

If we consider the enrolment in all public schools (urban and rural combined), we find that the proportion of all pupils enrolled in these schools was 85 per cent in 1960. This proportion had decreased from 94 per cent in 1946 (see table IV-3). This shows a growing importance of private schools at this level of education, due mainly to the exceptionally rapid rate of growth of private schools in urban areas, as noted above. However, even in rural areas the rate of growth of private schools had surpassed that of public schools. Also, over the period of 14 years, the proportion of all pupils enrolled in urban schools (public and private combined) had increased from 49 per cent in 1946 to 62 per cent in 1960. These trends seem fairly clear from table IV-3.

Table IV-1 Colombia: *Pupil enrolment in all schools at the first and second levels of education, 1951-1960.*

(Enrolment by thousands)

Year	First level	Second level			Total first and second levels
	All primary schools	General secondary schools	Teacher training schools	Vocational secondary schools	
1951	875	64.4	7.4	35.1	982
1952	923	65.2	7.8	36.7	1 033
1953	1 055	65.6	8.6	40.5	1 170
1954	1 125	69.9	9.9	37.8	1 243
1955	1 236	77.4	11.8	45.4	1 371
1956	1 312	93.3	14.3	73.3	1 493
1957	1 381	107.6	16.4	68.1	1 573
1958	1 493	115.0	19.1	80.4	1 708
1959	1 569	128.5	24.0	80.3	1 802
1960	1 690	140.3	28.0	85.4	1 944

Source: Unless otherwise noted, all school enrolment data used in this and subsequent tables are taken from: Colombia. Departamento Administrativo Nacional de Estadística. *Anuario General de Estadística,* annual volumes, 1951-1960. Bogotá, 1954-1962.

Table IV-2 Colombia: *Pupil enrolment in all primary schools, 1946-1960, by public and private, urban and rural schools.*

(Enrolment by thousands)

Year	All primary schools	Public schools		Private schools	
		Urban	Rural	Urban	Rural
1946	712	307	361	41	2.3
1947	739	315	372	48	2.7
1948	765	331	389	45	1.3
1949	766	341	395	29	1.1
1950	808	360	398	49	1.6
1951	875	383	414	74	4.1
1952	923	419	427	77	0.3
1953	1 055	459	465	129	2.1
1954	1 125	486	491	145	2.9
1955	1 236	530	524	177	5.6
1956	1 312	578	536	193	4.9
1957	1 381	623	545	208	4.8
1958	1 493	692	576	221	4.3
1959	1 569	737	594	232	6.1
1960	1 690	799	633	252	6.2

Table IV-3 Colombia: *Primary school enrolment, 1946-1960, by public and private schools, and by urban and rural schools.*

(Enrolment by thousands)

Year	All primary schools	Public	Private	Per cent public	Urban	Rural	Per cent urban
1946	712	668	44	*94*	349	363	*49*
1947	739	688	51	*93*	364	375	*49*
1948	765	719	46	*94*	375	390	*49*
1949	766	736	30	*96*	370	397	*48*
1950	808	758	50	*94*	409	400	*50*
1951	875	797	78	*91*	457	418	*52*
1952	923	846	77	*92*	496	427	*54*
1953	1 055	923	131	*87*	588	467	*56*
1954	1 125	977	148	*87*	631	494	*56*
1955	1 236	1 053	183	*85*	707	529	*57*
1956	1 312	1 114	198	*85*	771	541	*59*
1957	1 381	1 168	213	*85*	831	550	*60*
1958	1 493	1 268	225	*85*	913	580	*61*
1959	1 569	1 331	238	*85*	969	600	*62*
1960	1 690	1 432	258	*85*	1 051	639	*62*

The percentage of girls enrolled in all primary schools had increased somewhat from 49 per cent in 1946 to 50 per cent in 1960. This increase is due largely to the urban schools, where the proportion of girls enrolled rose from 50 per cent in 1946 to 51 per cent in 1960. In the rural schools, there was a slight decrease from 49 per cent in 1946 to 48 per cent in 1960. These trends are shown in detail in table IV-4.

We have official data on primary school enrolment published in detail every year, by age, sex and grade, separately for public urban, public rural, private urban and private rural schools. We have summarized these data for 1960 in two tables: table IV-5 showing the distribution for urban schools, public and private; and table IV-6 for rural schools, public and private. Since the number of pupils in each age-sex-grade category for private schools is relatively small compared with public schools, we shall combine the enrolment in public and private schools, and keep the distinction only between the urban and rural schools.

First, analysing the distribution of pupils by age, we note at once that there is a very wide range of ages among pupils of the same grade, in both the urban and rural schools. In grades 1 and 2, all age groups are represented from 7 years and under to 15 years and over. The median age of pupils in grade 1 was 8.6 years for boys, 8.5 years for girls, and 8.6 years for both sexes in urban schools. For pupils in grade 2, the corresponding median ages were: 10.0 years for boys, 9.9 years for girls, and 9.9 years for both sexes. The difference between sexes disappears in grade 3, where the median age for boys and girls alike was 11.1 years. Thereafter, the girls tended to be slightly older than the boys. In rural schools, the pupils were generally older than their counterparts in urban schools, and the boys were older than the girls, on the average, in every grade except the fourth. (See table IV-7.)

Table IV-4 Colombia : *Female pupils as percentage of all pupils in primary schools, by urban and rural schools, 1946-1960*

(Enrolment by thousands)

Year	All primary schools		Urban primary schools		Rural primary schools	
	Number of pupils	Per cent female	Number of pupils	Per cent female	Number of pupils	Per cent female
1946	712	49	349	50	363	49
1947	739	49	364	50	375	48
1948	765	49	375	50	390	48
1949	766	49	370	50	397	48
1950	808	49	409	50	400	48
1951	875	49	457	50	418	48
1952	923	49	496	49	427	48
1953	1 055	49	588	50	467	47
1954	1 125	49	631	51	494	48
1955	1 236	49	707	50	529	48
1956	1 312	49	771	50	541	47
1957	1 381	49	831	51	550	48
1958	1 493	50	913	51	580	48
1959	1 569	50	969	51	600	48
1960	1 690	50	1 051	51	639	48

Table IV-5 Colombia: *Age, sex and grade distribution of pupils enrolled in urban primary schools, 1960*

Age	Sex	Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Total	
		Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
7 and under	Male	42 982	19 101	2 959	2 598	–	–	–	–	–	–	45 941	21 699
	Female	46 856	18 668	3 060	1 384	–	–	–	–	–	–	49 916	20 052
8	Male	42 806	8 686	18 780	8 495	1 856	1 456	–	–	–	–	63 442	18 637
	Female	44 158	8 540	19 230	10 094	1 970	997	–	–	–	–	65 358	19 631
9	Male	25 772	4 250	25 322	5 791	11 472	7 990	1 190	909	–	–	63 756	18 940
	Female	26 126	3 711	27 052	6 939	11 351	8 351	1 283	722	–	–	65 812	19 723
10	Male	16 989	2 449	21 440	3 587	17 731	5 302	6 646	6 426	1 014	1 984	63 820	19 748
	Female	17 398	1 984	22 858	4 067	18 176	6 373	6 441	6 259	847	1 457	65 720	20 140
11	Male	9 098	1 220	13 961	2 041	15 981	3 274	10 826	4 789	3 609	4 245	53 475	15 569
	Female	8 933	884	14 881	2 142	16 367	4 207	10 595	5 639	3 609	4 179	54 385	17 051
12	Male	6 239	855	10 255	1 603	13 801	2 433	12 355	4 009	7 271	5 103	49 921	14 003
	Female	5 790	542	10 505	1 387	13 672	3 014	12 265	5 366	7 444	6 343	49 676	16 652
13	Male	2 587	298	4 666	593	7 059	977	8 454	1 778	6 660	2 913	29 426	6 559
	Female	2 165	181	4 559	414	7 419	1 336	8 245	2 548	7 386	4 002	29 774	8 481
14	Male	1 135	167	2 082	320	3 493	527	4 771	1 073	5 384	1 924	16 865	4 011
	Female	895	80	1 799	167	3 417	663	4 662	1 441	5 655	2 892	16 428	5 243
15 and over	Male	843	90	763	187	1 201	305	2 096	542	3 436	1 377	8 339	2 501
	Female	400	77	630	143	1 130	356	1 721	782	3 099	1 965	6 980	3 323
Total	Male	185 567		125 443		94 858		65 864		44 920		516 652	
	Female	187 388		131 311		98 799		67 969		48 878		534 345	
	Both sexes	372 955		256 754		193 657		133 833		93 798		1 050 997	

Table IV-6 Colombia: *Age, sex and grade distribution of pupils enrolled in rural primary schools, 1960*

Age	Sex	Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Total	
		Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
7 and under	Male	54 765	551	1 676	33	-	-	-	-	-	-	56 441	584
	Female	54 532	506	2 083	34	-	-	-	-	-	-	56 615	540
8	Male	47 166	379	9 504	128	338	27	-	-	-	-	57 008	534
	Female	43 916	328	10 400	130	408	35	-	-	-	-	54 724	493
9	Male	35 210	232	16 311	179	1 532	82	111	3	-	-	53 164	496
	Female	32 300	214	17 372	122	1 514	63	98	2	-	-	51 284	401
10	Male	29 602	187	20 524	136	2 844	103	415	40	16	2	53 401	468
	Female	25 848	144	20 677	116	2 782	78	390	45	31	11	49 728	394
11	Male	17 125	119	16 740	142	2 945	91	743	61	128	13	37 681	426
	Female	14 653	105	16 443	94	2 983	99	702	57	105	19	34 886	374
12	Male	14 810	116	16 911	112	3 410	120	1 109	96	272	83	36 512	527
	Female	11 365	88	14 891	72	3 102	86	1 005	78	295	86	30 658	410
13	Male	6 678	44	8 338	36	2 076	32	752	32	277	12	18 121	156
	Female	5 000	18	7 405	30	1 896	37	758	21	181	11	15 240	117
14	Male	4 101	8	4 487	15	1 342	20	621	14	269	4	10 820	61
	Female	2 864	10	3 886	9	1 267	9	526	15	192	2	8 735	45
15 and over	Male	1 731	17	1 549	13	613	19	388	32	247	9	4 528	90
	Female	1 216	11	1 392	-	582	5	295	17	158	26	3 643	59
Total	Male	212 841		96 834		15 594		4 417		1 332		331 018	
	Female	193 118		95 156		14 946		4 009		1 117		308 346	
	Both sexes	405 959		191 990		30 540		8 426		2 449		639 364	

Table IV-7 Colombia *Median age of pupils in all primary schools, by sex and grade, and by urban and rural schools, 1960*

Schools	Sex	Age of pupils				
		Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Urban schools:						
Median age	Male	8.6	10.0	11.1	12.1	12.9
	Female	8.5	9.9	11.1	12.2	13.0
	Both sexes	8.6	9.9	11.1	12.2	13.0
Normal age for grade		(7.5)	(8.5)	(9.5)	(10.5)	(11.5)
Percentage of pupils above normal age		*52*	*61*	*64*	*66*	*64*
Rural schools:						
Median age	Male	9.1	11.0	11.9	12.7	13.5
	Female	8.9	10.8	11.8	12.7	13.1
	Both sexes	9.0	10.9	11.9	12.7	13.3
Normal age for grade		(7.5)	(8.5)	(9.5)	(10.5)	(11.5)
Percentage of pupils above normal age		*62*	*79*	*77*	*78*	*72*

Source: Age-sex-grade distribution of pupils shown in tables IV-5 and IV-6

Since compulsory schooling in Colombia begins after boys and girls have reached the age of 7 years, we may assume that the normal age for pupils in grade 1 should be 7.5 years. If they progress by one grade each year, the normal ages for the following grade should be: 8.5 in grade 2; 9.5 in grade 3; 10.5 in grade 4; and 11.5 in grade 5. Thus it may be seen that, in urban schools, the median age of pupils was about 1 year above normal in grade 1 and about 1.5 years above normal in each of the following grades. The discrepancy in rural schools is greater: about 1.5 years in grade 1; nearly 2.5 years in grades 2 and 3; and about 2 years in grades 4 and 5. This is, of course, due to the large number of pupils who fail to progress grade by grade normally and have to repeat their grades one or more times. As a result, about 60 per cent of all pupils in urban schools, and nearly 70 per cent of all pupils in rural schools, were above normal age for their grades.

We shall now proceed with a grade analysis of pupils, to find out what proportion of pupils progress regularly through primary school from grade to grade, what proportion of them repeat their grades at least once during their school course, and what proportion drop out of school before the completion of their primary schooling. For this we shall need to go back at least five years for enrolment data, separating the repeaters from the new pupils enrolled in each grade. We have such data available from the official sources, beginning in 1952. Since it is to be expected that many pupils would have transferred from public to private schools, and vice versa, or from rural to urban schools, and vice versa, we shall combine all primary school enrolment, public and private, urban and rural, and keep the distinction only between male and female pupils. Table IV-8 gives total enrolment, by sex and grade, of all pupils in primary schools, for each year from 1952 to 1960. Table IV-9 gives the number of repeaters, by sex and grade, for the same period of years. Table IV-10 gives the number of new pupils enrolled each year, by sex and grade, which is obtained by subtraction of the number of repeaters from the total number of pupils enrolled.

From table IV-8 to IV-10, we obtain grade progression ratios, percentages of repeaters, and grade retention ratios for each of the cohorts enrolled between 1952 and 1960, as shown in tables IV-11 to IV-13. The combined experience of all the cohorts is expressed by the average ratios shown in the last line of each table. Thus, about 46 per cent of all pupils in grade 1 progress to grade 2 the following year; about 27 per cent of them repeat the grade;

making a total of about 73 per cent remaining in school after their first year. Similarly, about 41 per cent of grade 2 pupils progress to grade 3; about 25 per cent repeat their grade; making a total of 66 per cent remaining in school for the next year. Among pupils in grade 3; about 61 per cent progress to grade 4; about 16 per cent are repeaters; totalling 77 per cent who remain in school during the following year. About the same proportion of grade 4 pupils remains in school, of which 65 per cent progress to grade 5 and 11 per cent repeat their grade. Finally, about 10 per cent of grade 5 pupils remain in school the following year as repeaters. These calculations are based on the average ratios for both sexes combined. As the difference between the experience of the male and female cohorts is very small in most cases, we may dispense with separate calculations for the two sexes. In other instances, it may be advisable, and even necessary, to carry out such separate calculations.

Table IV-8 Colombia: *Total enrolment in all primary schools, by sex and grade, 1952-1960*

Year	Sex	Number of pupils enrolled in each grade				
		1	2	3	4	5
1952	Male	242 349	132 900	54 394	43 745	
	Female	224 841	130 486	53 392	40 426	
	Both sexes	467 190	263 386	107 786	84 171	
1953	Male	276 746	150 235	62 518	38 721	19 866
	Female	256 536	147 227	61 671	38 228	20 784
	Both sexes	533 282	297 462	124 189	76 949	40 650
1954	Male	288 994	154 412	65 186	38 383	22 124
	Female	273 080	154 304	66 194	38 769	23 904
	Both sexes	562 074	308 716	131 380	77 152	46 028
1955	Male	315 017	168 948	73 590	43 970	27 015
	Female	296 128	166 948	73 325	43 735	27 408
	Both sexes	611 145	335 896	146 915	87 705	54 423
1956	Male	327 793	178 950	79 296	49 013	32 057
	Female	309 927	176 385	78 326	48 548	31 240
	Both sexes	637 720	355 335	157 622	97 561	63 297
1957	Male	335 861	189 484	85 166	53 736	34 498
	Female	319 300	188 445	85 607	53 378	35 815
	Both sexes	655 161	377 929	170 773	107 114	70 313
1958	Male	366 415	196 584	92 660	58 747	39 144
	Female	349 311	197 060	93 557	59 188	40 457
	Both sexes	715 726	393 644	186 217	117 935	79 601
1959	Male	373 229	209 304	99 905	64 381	44 283
	Female	355 539	210 040	99 280	64 966	47 645
	Both sexes	728 768	419 344	199 185	129 347	91 928
1960	Male	398 408	222 277	110 452	70 281	46 252
	Female	380 506	226 467	113 745	71 978	49 995
	Both sexes	778 914	448 744	224 197	142 259	96 247

Table IV-9 Colombia: *Number of repeaters in all primary schools, by sex and grade, 1952-1960*

Year	Sex	Number of repeaters in each grade				
		1	2	3	4	5
1952	Male	61 759	32 842	8 450	5 379	
	Female	54 430	32 711	8 370	3 999	
	Both sexes	116 189	65 553	16 820	9 378	
1953	Male	74 315	36 389	9 067	4 156	1 762
	Female	65 889	35 570	8 985	4 007	1 897
	Both sexes	140 204	71 959	18 052	8 163	3 659
1954	Male	78 600	37 609	9 839	3 996	2 014
	Female	69 255	36 954	9 993	4 039	2 001
	Both sexes	147 855	74 563	19 832	8 035	4 015
1955	Male	82 880	39 703	10 690	4 816	2 368
	Female	73 445	39 703	10 814	4 618	2 544
	Both sexes	156 325	79 406	21 504	9 434	4 912
1956	Male	85 993	40 927	11 045	4 861	2 651
	Female	76 909	40 734	11 114	5 076	2 597
	Both sexes	162 902	81 661	22 159	9 937	5 248
1957	Male	88 351	43 246	12 205	5 735	3 152
	Female	78 208	42 822	12 103	5 467	3 269
	Both sexes	166 559	86 068	24 308	11 202	6 421
1958	Male	92 422	45 278	13 416	6 383	3 639
	Female	82 559	45 055	13 313	6 446	3 667
	Both sexes	174 981	90 333	26 729	12 829	7 306
1959	Male	92 745	44 949	12 615	5 711	2 911
	Female	82 450	43 536	12 120	4 752	2 449
	Both sexes	175 195	88 485	24 735	10 463	5 360
1960	Male	105 476	52 637	17 175	8 482	5 046
	Female	94 698	53 387	17 125	8 557	5 225
	Both sexes	200 174	106 024	34 300	17 039	10 271

By compounding these average grade retention ratios, we obtain a first approximation of over-all school retention ratios for a cohort of grade 1 pupils, as follows:

Starting with a given cohort of grade 1 pupils :	10 000
After the first year, 73.11 per cent of these would have remained in school (.7311 x 10,000):	7 311
After the second year, 66.26 per cent of those remaining would have continued in school (.6626 x 7,311):	4 844
After the third year, 76.70 per cent of these would have continued in school for the next year (. 7670 x 4,844):	3 715
After the fourth year, 76.76 per cent of these would have been left in school (.7676 x 3,715):	2 852
After the fifth year, 9.80 per cent of these would have remained as repeaters in the fifth grade (.0980 x 2,852):	279

A more refined method of computing the over-all school retention ratios will be introduced in the next section of this chapter.

Since the end result of primary schooling is represented in the number of pupils who successfully complete their fifth grade (normally after five years at school), we shall compare the number of pupils who passed their examination at the end of grade 5 each year with the number of new pupils who were enrolled in grade 1 four years earlier. Thus we find that the percentage of each cohort successfully completing its primary schooling has increased from about 13 per cent (of the 1952 cohort) to about 16 per cent (of the 1956 cohort). The difference between the sexes is slightly in favour of the girls, but is hardly significant for the most recent cohort which completed its primary schooling in 1960. (See table IV-14). It should be noted that, due to the considerable number of repeaters grade by grade, the pupils who completed their fifth grade in any given year actually came from several different cohorts, and pupils in any single cohort would have completed their schooling in several successive years. However, we might assume that these retarding effects cancel each other to a large extent.

Table IV-10 Colombia: *Number of new pupils in all primary schools, by sex and grade, 1952-1960*

Year	Sex	Number of new pupils in each grade				
		1	2	3	4	5
1952	Male	180 590	100 058	45 944	38 366	
	Female	170 411	97 775	45 022	36 427	
	Both sexes	351 001	197 833	90 966	74 793	
1953	Male	202 431	113 846	53 451	34 565	18 104
	Female	190 647	111 657	52 686	34 221	18 887
	Both sexes	393 078	225 503	106 137	68 786	36 991
1954	Male	210 394	116 803	55 347	34 387	20 110
	Female	203 825	117 350	56 201	34 730	21 903
	Both sexes	414 219	234 153	111 548	69 117	42 013
1955	Male	232 137	129 245	62 900	39 154	24 647
	Female	222 683	127 245	62 511	39 117	24 864
	Both sexes	454 820	256 490	125 411	78 271	49 511
1956	Male	241 800	138 023	68 251	44 152	29 406
	Female	233 018	135 651	67 212	43 472	28 643
	Both sexes	474 818	273 674	135 463	87 624	58 049
1957	Male	247 510	146 238	72 961	48 001	31 346
	Female	241 092	145 623	73 504	47 911	32 546
	Both sexes	488 602	291 861	146 465	95 912	63 892
1958	Male	273 993	151 306	79 244	52 364	35 505
	Female	266 752	152 005	80 244	52 742	36 790
	Both sexes	540 745	303 311	159 488	105 106	72 295
1959	Male	280 484	164 355	87 290	58 670	41 372
	Female	273 089	166 504	87 160	60 214	45 196
	Both sexes	553 573	330 859	174 450	118 884	86 568
1960	Male	292 932	169 640	93 277	61 799	41 206
	Female	285 808	173 080	96 620	63 421	44 770
	Both sexes	578 740	342 720	189 897	125 220	85 976

Table IV-11 Colombia: *Grade progression ratios of pupils in all primary schools, by sex and grade, 1952-1960*

(Percentage ratios)

Cohort	Sex	Grade progression ratio between grades			
		1 and 2	2 and 3	3 and 4	4 and 5
1952	Male	46.98	40.22	63.55	...
	Female	49.66	40.38	64.09	...
	Both sexes	48.27	40.30	63.84	...
1953	Male	42.21	36.84	55.00	51.94
	Female	45.74	38.17	56.31	57.30
	Both sexes	43.91	37.50	55.65	54.60
1954	Male	44.72	40.74	60.07	64.21
	Female	46.60	40.51	59.09	64.13
	Both sexes	45.63	40.62	59.58	64.17
1955	Male	43.81	40.40	60.00	66.88
	Female	45.81	40.26	59.29	65.49
	Both sexes	44.78	40.33	59.64	66.19
1956	Male	44.61	40.77	60.53	63.95
	Female	46.99	41.67	61.17	67.04
	Both sexes	45.77	41.22	60.85	65.49
1957	Male	45.05	41.82	61.48	66.07
	Female	47.61	42.58	61.61	68.92
	Both sexes	46.30	42.20	61.55	67.49
1958	Male	44.85	44.40	63.32	70.42
	Female	47.67	44.23	64.36	76.36
	Both sexes	46.23	44.32	63.84	73.40
1959	Male	45.45	44.57	61.86	64.00
	Female	48.68	46.00	63.88	68.91
	Both sexes	47.03	45.28	62.87	67.47
Average: 1952-1959	Male	44.71	41.22	60.73	63.92
	Female	47.35	41.73	61.23	66.88
	Both sexes	45.99	41.47	60.98	65.40

Source: Calculated from data in tables IV-8 and IV-10.

Table IV-12 Colombia: *Percentage of repeaters in all primary schools, by sex and grade, 1952-1960*

Cohort	Sex	Percentage of repeaters the year after in				
		grade 1	grade 2	grade 3	grade 4	grade 5
1952	Male	30.66	27.38	16.67	...	...
	Female	29.30	27.26	16.83	...	...
	Both sexes	30.01	27.32	16.75	...	...
1953	Male	28.40	25.03	15.74	10.32	10.14
	Female	27.00	25.10	16.20	10.57	9.63
	Both sexes	27.73	25.07	15.97	10.44	9.88
1954	Male	28.68	25.71	16.41	12.55	10.70
	Female	26.90	25.73	16.34	11.91	10.64
	Both sexes	27.81	25.72	16.37	12.23	10.67
1955	Male	27.30	24.22	15.01	11.05	9.82
	Female	25.97	24.40	15.15	11.61	9.47
	Both sexes	26.66	24.31	15.09	11.33	9.64
1956	Male	26.95	24.17	15.39	11.70	9.83
	Female	25.23	24.28	15.45	11.26	10.46
	Both sexes	26.12	24.22	15.42	11.48	10.14
1957	Male	27.52	23.90	15.75	11.88	10.55
	Female	25.86	23.91	15.55	12.08	10.24
	Both sexes	26.71	23.90	15.65	11.98	10.39
1958	Male	25.31	22.87	13.61	9.72	7.44
	Female	23.60	22.09	12.95	8.03	6.05
	Both sexes	24.48	22.48	13.28	8.87	6.73
1959	Male	28.26	25.15	17.19	13.17	11.39
	Female	26.64	25.42	17.25	13.17	10.97
	Both sexes	27.47	25.28	17.22	13.17	11.17
Average: 1952-1959	Male	*27.89*	*24.80*	*15.72*	*11.48*	*9.98*
	Female	*26.31*	*24.77*	*15.72*	*11.23*	*9.64*
	Both sexes	*27.12*	*24.79*	*15.72*	*11.36*	*9.80*

Source: Calculated from data in tables IV-8 and IV-9.

Table IV-13 Colombia: *Grade retention ratios of pupils in all primary schools, by sex and grade, 1952-1960*

(Percentage ratios)

Cohort	Sex	Grade retention ratios between grades				Retention after grade 5
		1 and 2	2 and 3	3 and 4	4 and 5	
1952	Male	77.64	67.60	80.22	...	...
	Female	78.96	67.64	80.92	...	...
	Both sexes	78.28	67.62	80.59	...	...
1953	Male	70.61	61.87	70.74	62.26	10.14
	Female	72.74	63.27	72.51	67.87	9.63
	Both sexes	71.64	62.57	71.62	65.04	9.88
1954	Male	73.40	66.45	76.48	76.76	10.70
	Female	73.50	66.24	75.43	76.04	10.64
	Both sexes	73.44	66.34	75.95	76.40	10.67
1955	Male	71.11	64.62	75.01	77.93	9.82
	Female	71.78	64.66	74.44	77.10	9.47
	Both sexes	71.44	64.64	74.73	77.52	9.64
1956	Male	71.57	64.94	75.93	75.66	9.83
	Female	72.22	65.95	76.62	78.30	10.46
	Both sexes	71.88	65.44	76.27	76.97	10.14
1957	Male	72.57	65.72	77.24	77.95	10.55
	Female	73.46	66.49	77.16	81.00	10.24
	Both sexes	73.00	66.10	77.20	79.47	10.39
1958	Male	70.17	67.27	76.93	80.15	7.44
	Female	71.27	66.32	77.32	84.39	6.05
	Both sexes	70.70	66.80	77.12	82.27	6.73
1959	Male	73.71	69.71	79.05	77.18	11.39
	Female	75.32	71.42	81.13	82.08	10.97
	Both sexes	74.49	70.57	80.09	79.65	11.17
Average: 1952-1959	Male	72.60	66.02	76.45	75.41	9.98
	Female	73.66	66.50	76.94	78.11	9.64
	Both sexes	73.11	66.26	76.70	76.76	9.80

Source: Calculated from data in tables IV-8, IV-9, and IV-10

Table IV-14 Colombia: *Number of pupils who successfully completed their primary schooling, 1956-1960, compared with new pupils in grade 1, 1952-1956*

Year	Sex	Cohort of new pupils in grade 1 (a)	Year	Sex	Number of pupils who passed their examination in grade 5 (b)	(b) as % of (a)
1952	Male	180 590	1956	Male	22 925	*12.7*
	Female	170 411		Female	23 247	*13.6*
	Both sexes	351 001		Both sexes	46 172	*13.2*
1953	Male	202 431	1957	Male	26 235	*13.0*
	Female	190 647		Female	26 023	*13.6*
	Both sexes	393 078		Both sexes	52 258	*13.3*
1954	Male	210 394	1958	Male	29 757	*14.1*
	Female	203 825		Female	31 373	*15.4*
	Both sexes	414 219		Both sexes	61 130	*14.8*
1955	Male	232 137	1959	Male	32 729	*14.1*
	Female	222 683		Female	34 575	*15.5*
	Both sexes	454 820		Both sexes	67 304	*14.8*
1956	Male	241 800	1960	Male	38 354	*15.9*
	Female	233 018		Female	37 562	*16.1*
	Both sexes	474 818		Both sexes	75 916	*16.0*

Finally, we shall compare the number of pupils enrolled in all primary schools with the estimated school-age population of the country. Official estimates of the population 7-14 years of age, considered as the school-age population, are available for each year since 1945 (excepting 1955). When we compare the total enrolment in all primary schools with these estimates of the school-age population, we find that the proportion of the school-age population enrolled in primary school has increased from about 33 per cent in 1945 to about 60 per cent in 1960. (See table IV-15.)

However, the development of primary education in urban and in rural areas has been quite disparate as may be seen from the following comparisons, based on official data available for 1957, 1958 and 1959:

Year	Estimated urban population 7-14 years of age (thousands) (a)	Enrolment in all urban primary schools		Estimated rural population 7-14 years of age (thousands) (c)	Enrolment in all rural primary schools	
		Thousands of pupils (b)	(b) as % of (a)		Thousands of pupils (d)	(d) as % of (c)
1957	961	831	*86.5*	1 616	550	*34.0*
1958	984	913	*92.8*	1 649	580	*35.2*
1959	1 009	969	*96.0*	1 687	600	*35.6*

We shall now turn to an analysis of available data relating to all types of education at the second level. We shall distinguish three broad types of schools at this level: (a) the general secondary schools (*enseñanza secundaria general o bachillerato*), of six years' duration; (b) the teacher training schools, of which there are two types - the *escuela normal superior*, also of six years' duration, and the *escuela normal rural*, of four years' duration; and (c) all forms of vocational secondary schools (*enseñanza secundaria técnica*), including industrial schools of five to seven years' duration, commercial schools of four to five years' duration, agricultural schools of three to six years' duration, training schools for nursing assistants (*escuela auxiliar de enfermería*) of three to five years' duration, schools of rural household arts (*enseñanza hogar para campesinas*) of three years' duration, *escuelas complementarias* of four to five years' duration, besides schools of fine arts and private religious schools, and other secondary schools not otherwise specified.

Table IV-15 Colombia: *Total enrolment in all primary schools, compared with estimated population 7-14 years of age, 1945-1954; 1956-1960*
(Thousands of persons and of pupils)

Year	Estimated population 7-14 years of age (a)	Total enrolment in all primary schools		Year	Estimated population 7-14 years of age (b)	Total enrolment in all primary schools	
		Number	As % of (a)			Number	As % of (b)
1945	2 030	678	33.4	1953	2 422	1 055	43.6
1946	2 076	712	34.3	1954	2 474	1 125	45.5
1947	2 122	739	34.8	1956	2 537	1 312	51.7
1948	2 169	765	35.3	1957	2 577	1 381	53.6
1949	2 217	766	34.6	1958	2 634	1 493	56.7
1950	2 252	808	35.9	1959	2 696	1 569	58.2
1951	2 302	875	38.0	1960	2 826	1 690	59.8
1952	2 360	923	39.1				

Sources: 1945-1954: *Estudio sobre las condiciones del desarrollo de Colombia;* 1956-1960: *Anuario general de estadística*, volumes 1956 to 1960

Pupils enrolled in most of these schools are reported by year of study and by age, but without cross-tabulation. These data, for 1960, are summarized in tables IV-16 to IV-18. Since private schools are of particular importance among the general secondary schools, we have kept the distinction between public and private schools in this category. In the other categories we have combined the public and the private school enrolments, although in the case of the commercial schools, the enrolment was predominantly in private schools. Table IV-16 shows that, of the total enrolment in general secondary schools, as of 1960, about 64 per cent were pupils in private schools and only 36 per cent in public schools. Two-thirds of all pupils were male and one-third female. Female pupils constituted about 20 per cent of all enrolment in the public schools, and about 40 per cent in the private schools. The median age of pupils in these schools was around 16 years for male pupils and 15 years for female pupils. The median year of study was approximately the third year for male pupils and about halfway between the second and third years for female pupils. (See table IV-16.)

More than three-fourths of all the pupils in teacher training schools were female, the proportion of female pupils being somewhat higher (81 per cent) in the rural teacher training schools, as compared with that in the higher teacher training schools (75 per cent). The median age of male pupils in all teacher training schools was nearly 17 years, while the median age of female pupils was one year lower. In the higher teacher training schools, of six years' duration, about three-fourths of the pupils were in their first, second or third year of study; while in the rural teacher training schools, with a four-year course, more than two-thirds of the pupils were in their first or second year of study. The median year of study for all pupils in the higher teacher training schools was somewhat below the third year; it was slightly above the second year in the rural teacher training schools. (See table IV-17.)

Table IV-16 Colombia: *Pupils enrolment in general secondary schools, public and private, distributed by sex and year of study, and by sex and age, 1960*

Distribution of pupils	Public schools		Private schools	
	Male	Female	Male	Female
(a) *By year of study:*				
First year	13 057	4 193	16 661	12 052
Second year	8 555	2 527	11 535	8 834
Third year	6 478	1 611	9 064	6 480
Fourth year	5 325	1 048	6 856	4 473
Fifth year	3 906	573	5 208	2 620
Sixth year	3 015	439	3 937	1 882
(b) *By age of pupils:*				
Under 12 years	481	121	1 239	808
12 years	2 853	933	5 287	3 916
13 years	4 850	1 709	7 390	6 084
14 years	6 073	2 046	8 657	6 874
15 years	6 353	2 104	8 331	6 889
16 years	5 691	1 462	7 325	5 280
17 years	4 975	1 017	5 899	3 513
18 years	3 787	601	4 368	1 851
19 years	2 736	263	2 280	687
20 years and over	2 537	135	2 485	439
Total number of pupils	40 336	10 391	53 261	36 341
Median year of study	*2.8*	*2.4*	*2.9*	*2.7*
Median age of pupil	15.9	*15.2*	*15.5*	*15.1*

In the industrial schools, male pupils outnumbered female pupils by approximately 3 to 1. Their median age (16.6 years) and median year of study (2.2) were approximately the same as for female pupils. Female pupils outnumbered male pupils in the commercial schools by more than 2 to 1. Their median age (15.9 years) was about a year and a half lower than the median age of male pupils (17.3 years). The median year of study (2.1 for male pupils; 2.2 for female pupils) indicates that nearly half of all pupils enrolled were in their first year of study. This last observation applies equally to the other types of vocational schools combined, where the number of female pupils in their first year of study was actually just over half of the total female enrolment. (See table IV-18.)

We shall now attempt to find the grade retention ratios for pupils in general secondary schools, in the same manner as we have done for the primary school pupils. However, in this case we do not have the data on number of repeaters, so we can only relate the total number of pupils in their first year of study in a given year to the total number in their second year of study the year following, and so on. We shall assume that there is a transfer of pupils between the public and the private schools, so we shall combine the enrolment of public and private schools. We shall not add up the male and female pupils, as we did in the case of primary school enrolment, because here we have a larger difference between the sexes, both in the number of pupils enrolled in each year of study and in their manner of progression through the secondary school.

Table IV-19 gives the number of pupils of each sex enrolled in general secondary schools, by year of study, for each year from 1953 to 1960. Dividing the number of pupils in the second year of study in a given year by the enrolment in the first year of study in the previous year gives us an approximate retention ratio for that cohort. This can be done similarly for the other cohorts until the sixth year of study is reached. These approximate retention ratios are shown in table IV-20. The average ratios, based on the combined experience of seven cohorts, imply that of 100 male pupils beginning their first year of study, about 76 would remain in school the following year. After two years, only 66 would still remain; after three years, 58; after four years, 49; after five years, 44. The experience of female pupils would be less favourable. Out of 100 female pupils beginning their first year of study together, only 73 would be left during their second year; 57 after two years; 42 after three years; 26 after four years; and only 22 after five years. A slightly more refined method of computing these over-all retention ratios will be found in the next section of this chapter.

Table IV-17 Colombia: *Pupils enrolment in "higher" and "rural" teacher training schools (public and private schools combined), distributed by sex and year of study, and by sex and age, 1960*

Distribution of pupils	"Higher" teacher training schools		"Rural" teacher training schools	
	Male	Female	Male	Female
(a) *By year of study:*				
First year	1 724	5 153	744	2 959
Second year	997	3 402	416	1 895
Third year	768	2 310	293	1 289
Fourth year	566	1 670	237	976
Fifth year	470	1 021	-	-
Sixth year	336	797	-	-
(b) *By age of pupils:*				
Under 12 years	37	99	16	258
12 years	262	796	67	317
13 years	472	1 815	111	793
14 years	574	2 534	191	1 130
15 years	678	2 664	247	1 383
16 years	601	2 200	258	1 080
17 years	635	1 717	247	936
18 years	528	1 143	171	604
19 years	395	707	149	322
20 years and over	679	678	233	296
Total number of pupils:	4 861	14 353	1 690	7 119
Median year of study	*2.7*	*2.6*	*2.2*	*2.3*
Median age of pupil	*16.7*	*15.7*	*16.8*	*15.8*

Table IV-18 Colombia: *Pupil enrolment in vocational secondary schools, (public and private schools combined), distributed by sex and year of study, and by sex and age, 1960*

Distribution of pupils	Industrial schools		Commercial schools		Other types of vocational schools [1]	
	Male	Female	Male	Female	Male	Female
(a) *By year of study*						
First year	4 144	1 383	5 553	13 035	1 462	3 987
Second year	2 118	711	2 956	7 776	826	2 018
Third year	1 282	671	1 343	4 762	487	1 219
Fourth year	860	293	1 186	2 262	184	402
Fifth year	395	140	560	744	182	148
Sixth year	147	52	-	-	6	-
Seventh year	47	-	-	-	-	-
(b) *By age of pupils :*						
Under 12 years	84	55	185	315	...	...
12 years	270	216	480	1 585	...	...
13 years	753	339	483	2 744	...	...
14 years	1 176	459	893	4 341	...	...
15 years	1 330	412	1 562	5 743	...	...
16 years	1 555	372	1 694	5 146	...	...
17 years	1 179	423	1 749	4 118	...	...
18 years	1 197	481	1 598	2 546	...	...
19 years	703	198	1 356	1 212	...	...
20 years and over	746	295	1 598	829	...	...
Total number of pupils:	8 993	3 250	11 598	28 579	3 147	7 774
Median year of study	*2.2*	*2.3*	*2.1*	*2.2*	*2.1*	*2.0*
Median age of pupil	*16.6*	*16.4*	*17.3*	*15.9*	...	...

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1. Including agricultural, rural household arts, nursing assistants schools, and *escuelas complementarias*; excluding fine arts and religious schools and other secondary schools not otherwise specified. Total enrolment in the latter types of schools, not distributed by year of study or by age, comprised 13,030 male and 9,045 female pupils in 1960.

- Nil

... Information not available

Again, the end result of general secondary education would be represented by the number of pupils who successfully complete their secondary course (normally in six years, disregarding the possibility of repeaters passing their final examination in later years). From data available on three cohorts of each sex, we arrive at the following comparisons:

Year	Sex	Cohort of pupils in first year of study (a)	Year	Sex	Number of pupils who passed final examination (b)	(b) as % of (a)
1953	Male	14 252	1958	Male	5 228	*36.7*
	Female	10 921		Female	1 763	*16.1*
1954	Male	14 902	1959	Male	5 745	*38.6*
	Female	9 431		Female	2 018	*21.4*
1955	Male	15 960	1960	Male	5 880	*36.8*
	Female	9 929		Female	2 190	*22.1*

Table IV-19 Colombia: *Enrolment in general secondary schools (public and private combined), by sex and year of study, 1953-1960*

Year	Sex	Number of pupils enrolled, by year of study					
		1st	2nd	3rd	4th	5th	6th
1953	Male	14 252	8 591	6 225	4 846	3 465	2 649
	Female	10 921	5 880	3 830	2 676	1 387	896
1954	Male	14 902	9 977	7 365	5 453	3 973	3 047
	Female	9 431	6 178	4 273	2 570	1 479	1 299
1955	Male	15 960	10 888	8 242	6 446	4 745	3 597
	Female	9 929	6 919	4 800	3 103	1 608	1 210
1956	Male	19 844	13 677	10 415	8 125	6 137	4 695
	Female	10 832	7 498	5 253	3 559	1 914	1 400
1957	Male	22 612	15 233	12 172	9 405	6 750	5 295
	Female	12 552	8 689	6 443	4 447	2 378	1 651
1958	Male	23 812	16 187	12 512	10 114	7 448	5 685
	Female	14 132	9 215	6 651	4 620	2 670	1 995
1959	Male	27 043	18 634	14 218	11 280	8 653	6 629
	Female	14 661	10 448	7 135	4 973	2 725	2 098
1960	Male	29 718	20 090	15 542	12 181	9 114	6 952
	Female	16 245	11 361	8 091	5 521	3 193	2 321

Table IV-20 Colombia: *Approximate grade retention ratios in all general secondary schools, by sex and year of study, 1953-1960*

(Percentage ratios)

Cohort	Sex	Approximate retention ratios between years of study				
		1st and 2nd	2nd and 3rd	3rd and 4th	4th and 5th	5th and 6th
1953	Male	70.00	85.73	87.60	81.99	87.94
	Female	56.57	72.67	67.10	55.27	92.98
1954	Male	73.06	82.61	87.52	87.02	90.54
	Female	73.36	77.70	72.62	62.57	81.81
1955	Male	85.70	95.66	98.58	95.21	98.95
	Female	75.52	75.92	74.15	61.68	87.06
1956	Male	76.76	89.00	90.30	83.08	86.28
	Female	80.22	85.93	84.66	66.82	86.26
1957	Male	71.59	82.14	83.09	79.19	84.22
	Female	73.41	76.55	71.71	60.04	83.89
1958	Male	78.25	87.84	90.15	85.55	89.00
	Female	73.93	77.43	74.77	58.98	78.58
1959	Male	74.29	83.41	85.67	80.80	80.34
	Female	77.49	77.44	77.38	64.21	85.17
Average:	Male	*75.66*	*86.63*	*88.99*	*84.69*	*88.18*
1953-1959	Female	*72.93*	*77.66*	*74.63*	*61.37*	*85.11*

Source: Calculated from data in table IV-19.

Since our data on enrolment in teacher training schools and various types of vocational secondary schools are not homogeneous, we shall not try to work out even approximate retention ratios. However, we shall note, in the case of teacher training schools, that the number of pupils who passed their final examination each year during the most recent years were: 1,578 in 1958; 1,838 in 1959; and 2,099 in 1960. These numbers represent about 50 per cent of the number of pupils who began their training in the period 1953-1955, five years earlier. Compared with the total number of pupils enrolled in all teacher training schools during the earlier period, the proportion of those completing their training five years later was about 18 per cent, as shown below:

Year	Total enrolment in all teacher training schools (a)	Number of pupils in first year of study (b)	Year	Number who passed final examination (c)	(c) as % of (b)	(c) as % of (a)
1953	8 611	3 190	1958	1 578	*49.5*	*18.3*
1954	9 869	3 580	1959	1 838	*51.3*	*18.6*
1955	11 802	4 324	1960	2 099	*48.5*	*17.8*

Adding together the pupil enrolment in all types of schools at the second level - general, teacher training and vocational - and comparing the number of pupils enrolled with official estimates of the population 15-19 years of age, we note the steady increase in the secondary enrolment ratio from about 9 in 1951 to about 18 in 1960, as follows.

Year	Population 15-19 years of age according to Census (C) or official estimate (E) (thousands)	Total enrolment of pupils in all schools at the second level (thousands)	Secondary enrolment ratio (per cent)
1951	(C) 1 150	107	9
1956	(E) 1 289	181	14
1957	(E) 1 318	192	15
1958	(E) 1 347	215	16
1959	(E) 1 377	233	17
1960	(E) 1 408	254	18

3. ESTIMATING FUTURE SCHOOL ENROLMENT

Having analysed the basic data available concerning school enrolment at the first and second levels of education, we shall now proceed to make some reasonable estimates of future enrolment of pupils at these levels. We shall first estimate the probable size of total enrolment in all primary schools for each year between 1961 and 1966, and thereafter at five-year intervals for 1971, 1976 and 1981. For this purpose we shall make use of the various ratios worked out in the preceding section, concerning regular progression of pupils from one grade to the next, the percentage of pupils who repeat their grades, and the proportion of pupils who remain in school after passing through each grade.

We have seen from our preliminary analysis that, starting with a given cohort of 10,000 pupils in grade 1 and applying the *average* grade retention ratios, we might expect some 7,300 of them to remain in school after one year; about 4,800 to remain in school after two years; about 3,700 to remain after three years; nearly 2,900 to remain after four years; and about 300 who would still be in school after five years. There are, however, two sources of error in this approximate procedure. The first is due to the nature of the average ratios, which were based on the combined experience of 7 or 8 different cohorts. The actual experience of a given cohort, as it moves through the entire school course, may be quite different from what is implied by the average ratios. The second source of error is due to the complications arising from the fact that a pupil may repeat a grade more than once, whereas the application of the average ratios implies that all repeaters share the same experience as non-repeaters once they are grouped together in the same grade. The net effect of these sources of error is likely to underestimate the number of pupils remaining in school, mainly as repeaters, after the first year or two.

Wherever possible, therefore, it would be advisable to carry out a grade cohort analysis over a period of years – as much as twice the duration of the full primary school course – in order to establish overall school retention ratios which could serve as a guide for the estimation of future enrolment. We shall illustrate this procedure with two examples based on available data for Colombia: analysis of a grade 1 cohort of male pupils from 1955 to 1960; and of a cohort of both sexes from 1952 to 1960.

In order to provide for the possibility of some pupils repeating a grade more than once, but still keep our computations within realistic bounds, let us make an arbitrary assumption that pupils might repeat no more than three times in grade 1 or grade 2 and no more than twice in any of the higher grades.[1]

Now let us take a cohort of male pupils enrolled in grade 1 in 1955, starting with a round number of 10,000:

1955:	Cohort of male pupils in grade 1	10 000

From table IV-11 and table IV-12, we find that the grade progression ratio for a male cohort in 1955 between grades 1 and 2 was 43.81 per cent, and repeaters from the same cohort in grade 1 the next year was 27.30 per cent. Hence we put down, as pupils from our cohort remaining in school in 1956.

1956:	Pupils progressed from grade 1 to grade 2 (.4381 x 10,000)	4 381
	First-time repeaters in grade 1 (.2730 x 10,000)	2 730
	Total remaining in school	7 111

Again from tables IV-11 and IV-12, we find that the grade progression ratio and percentage of repeaters applicable to grade 2 pupils in 1956 were, respectively, 40.77 and 24.17. These ratios we shall apply to the 4,381 pupils who had previously passed to grade 2. The respective ratios applicable to grade 1 pupils in 1956 were 44.61 and 26.95, which we shall apply to the 2,730 pupils who had repeated grade 1.

1957:	Pupils progressed from grade 2 to grade 3 (.4077 x 4,381)	1 786
	First-time repeaters in grade 2 (.2417 x 4,381)	1 059
	Pupils progressed from grade 1 to grade 2 (.4461 x 2,730)	1 218
	Second-time repeaters in grade 1 (.2695 x 2,730)	736
	Total remaining in school	4 799

Following similar routine, we arrive at the numbers of pupils remaining in school in succeeding years, as following:

1958:	Pupils progressed from grade 3 to grade 4 (.6148 x 1,786)	1 098
	First-time repeaters in grade 3 (.1575 x 1,786)	281
	Pupils progressed from grade 2 to grade 3 (.4182 x 2,277)	952
	Second-time repeaters in grade 2 (.2390 x 1,059)	253
	First-time repeaters in grade 2 (.2390 x 1,218)	291
	Pupils progressed from grade 1 to grade 2 (.4505 x 736)	332
	Third-time repeaters in grade 1 (.2752 x 736)	203
	Total remaining in school	3 410
1959:	Pupils progressed from grade 4 to grade 5 (.7042 x 1,098)	773
	First-time repeaters in grade 4 (.0972 x 1,098)	107

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[1] Theoretically, under such an assumption a pupil might spend a maximum of 4 years in each of the first two grades, and a maximum of 3 years in each of the higher grades, making a total of 17 years spent in primary school! Of course this would be inconceivable, but we propose to make such an assumption mainly in order to facilitate our computation for purposes of illustration.

	Pupils progressed from grade 3 to grade 4 (.6332 x 1,233)	781
	Second-time repeaters in grade 3 (.1361 x 281)	38
	First-time repeaters in grade 3 (.1361 x 952)	130
	Pupils progressed from grade 2 to grade 3 (.4440 x 876)	389
	Third-time repeaters in grade 2 (.2287 x 253)	58
	Second-time repeaters in grade 2 (.2287 x 291)	67
	First-time repeaters in grade 2 (.2287 x 332)	76
	Pupils progressed from grade 1 to grade 2 (.4485 x 203)	91
	Fourth-time repeaters in grade 1 (none)	-
	Total remaining in school	2 510
1960.	First-time repeaters in grade 5 (.1139 x 773)	88
	Pupils progressed from grade 4 to grade 5 (.6400 x 888)	568
	Second-time repeaters in grade 4 (.1317 x 107)	14
	First-time repeaters in grade 4 (.1317 x 781)	103
	Pupils progressed from grade 3 to grade 4 (.6186 x 557)	345
	Third-time repeaters in grade 3 (none)	-
	Second-time repeaters in grade 3 (.1719 x 130)	22
	First-time repeaters in grade 3 (.1719 x 389)	67
	Pupils progressed from grade 2 to grade 3 (.4457 x 292)	130
	Fourth-time repeaters in grade 2 (none)	-
	Third-time repeaters in grade 2 (.2515 x 67)	17
	Second-time repeaters in grade 2 (.2515 x 76)	19
	First-time repeaters in grade 2 (.2515 x 91)	23
	Total remaining in school	1 396

Thus we may conclude that, for our cohort of male pupils in grade 1 in 1955, the over-all school retention ratios were as follows:

After the first year	71.11 per cent
After the second year	47.99 per cent
After the third year	34.10 per cent
After the fourth year	25.10 per cent
After the fifth year	13.96 per cent

We have carried out a similar analysis for a cohort of female pupils over the same period, and came to the following over-all school retention ratios:

After the first year	71.78 per cent
After the second year	48.96 per cent
After the third year	35.05 per cent
After the fourth year	26.48 per cent
After the fifth year	14.77 per cent

One might say that relatively more girls remained in school from year to year, but the difference between the sexes is not substantial.

In order to get a longer perspective, we shall now follow the progress of a cohort for eight years, from 1952 to 1960. Since the difference between the sexes was seen to be relatively small, we shall take a cohort of both sexes together. Again we shall be using the grade progression ratios and percentages of repeaters as given in tables IV-11 and IV-12. Without further explanations, we shall show the computational steps and results as follows:

1952:	Cohort of pupils, both sexes, in grade 1	10 000
1953:	Pupils progressed from grade 1 to grade 2 (.4827 x 10,000)	4 827
	First-time repeaters in grade 1 (.3001 x 10,000)	3 001
	Total remaining in school	7 828
1954:	Pupils progressed from grade 2 to grade 3 (.3750 x 4,827)	1 810
	First-time repeaters in grade 2 (.2507 x 4,827)	1 210
	Pupils progressed from grade 1 to grade 2 (.4391 x 3,001)	1 318
	Second-time repeaters in grade 1 (.2773 x 3,001)	832
	Total remaining in school	5 170

1955:	Pupils progressed from grade 3 to grade 4 (.5958 x 1,810)	1 078
	First-time repeaters in grade 3 (.1637 x 1,810)	296
	Pupils progressed from grade 2 to grade 3 (.4062 x 2,528)	1 027
	Second-time repeaters in grade 2 (.2572 x 1,210)	311
	First-time repeaters in grade 2 (.2572 x 1,318)	339
	Pupils progressed from grade 1 to grade 2 (.4563 x 832)	380
	Third-time repeaters in grade 1 (.2781 x 832)	231
	Total remaining in school	3 662
1956:	Pupils progressed from grade 4 to grade 5 (.6619 x 1,078	714
	First-time repeaters in grade 4 (.1133 x 1,078)	122
	Pupils progressed from grade 3 to grade 4 (.5964 x 1,323)	789
	Second-time repeaters in grade 3 (.1509 x 296)	45
	First-time repeaters in grade 3 (.1509 x 1,027)	155
	Pupils progressed from grade 2 to grade 3 (.4033 x 1,030)	415
	Third-time repeaters in grade 2 (.2431 x 311)	76
	Second-time repeaters in grade 2 (.2431 x 339)	82
	First-time repeaters in grade 2 (.2431 x 380)	92
	Pupils progressed from grade 1 to grade 2 (.4478 x 231)	103
	Fourth-time repeaters in grade 1 (none)	-
	Total remaining in school	2 593
1957:	First-time repeaters in grade 5 (.1014 x 714)	72
	Pupils progressed from grade 4 to grade 5 (.6549 x 911)	597
	Second-time repeaters in grade 4 (.1148 x 122)	14
	First-time repeaters in grade 4 (.1148 x 789)	-
	Pupils progressed from grade 3 to grade 4 (.6085 x 615)	374
	Third-time repeaters in grade 3 (none)	-
	Second-time repeaters in grade 3 (.1542 x 155)	24
	First-time repeaters in grade 3 (.1542 x 415)	64
	Pupils progressed from grade 2 to grade 3 (.4122 x 353)	146
	Fourth-time repeaters in grade 2 (none)	-
	Third-time repeaters in grade 2 (.2422 x 82)	20
	Second-time repeaters in grade 2 (.2422 x 92)	22
	First-time repeaters in grade 2 (.2422 x 103)	25
	Total remaining in school	1 449
1958:	Second-time repeaters in grade 5 (.1039 x 72)	7
	First-time repeaters in grade 5 (.1039 x 597)	62
	Pupils progressed from grade 4 to grade 5 (.6749 x 479)	323
	Third-time repeaters in grade 4 (none)	-
	Second-time repeaters in grade 4 (.1198 x 91)	11
	First-time repeaters in grade 4 (.1198 x 374)	45
	Pupils progressed from grade 3 to grade 4 (.6155 x 234)	144
	Third-time repeaters in grade 3 (none)	-
	Second-time repeaters in grade 3 (.1565 x 64)	10
	First-time repeaters in grade 3 (.1565 x 146)	23

	Pupils progressed from grade 2 to grade 3 (.4220 x 67)	28
	Fourth-time repeaters in grade 2 (none)	-
	Third-time repeaters in grade 2 (.2390 x 22)	5
	Second-time repeaters in grade 2 (.2390 x 25)	6
	Total remaining in school	664
1959:	Third-time repeaters in grade 5 (none)	-
	Second-time repeaters in grade 5 (.0673 x 62)	4
	First-time repeaters in grade 5 (.0673 x 323)	22
	Pupils progressed from grade 4 to grade 5 (.7340 x 200)	147
	Third-time repeaters in grade 4 (none)	-
	Second-time repeaters in grade 4 (.0887 x 45)	4
	First-time repeaters in grade 4 (.0887 x 144)	13
	Pupils progressed from grade 3 to grade 4 (.6384 x 61)	39
	Third-time repeaters in grade 3 (none)	-
	Second-time repeaters in grade 3 (.1328 x 23)	3
	First-time repeaters in grade 3 (.1328 x 28)	4
	Pupils progressed from grade 2 to grade 3 (.4432 x 11)	5
	Fourth-time repeaters in grade 2 (none)	-
	Third-time repeaters in grade 2 (.2248 x 6)	1
	Total remaining in school	242
1960:	Third-time repeaters in grade 5 (none)	-
	Second-time repeaters in grade 5 (.1117 x 22)	2
	First-time repeaters in grade 5 (.1117 x 147)	16
	Pupils progressed from grade 4 to grade 5 (.6647 x 56)	37
	Third-time repeaters in grade 4 (none)	-
	Second-time repeaters in grade 4 (.1317 x 13)	2
	First-time repeaters in grade 4 (.1317 x 39)	5
	Pupils progressed from grade 3 to grade 4 (.6287 x 12)	8
	Third-time repeaters in grade 3 (none)	-
	Second-time repeaters in grade 3 (.1722 x 4)	1
	First-time repeaters in grade 3 (.1722 x 5)	1
	Pupils progressed from grade 2 to grade 3 (.4528 x 1)	0
	Fourth-time repeaters in grade 2 (none)	-
	Total remaining in school	72

Summing up, we may say that, for our cohort of pupils in grade 1 in 1952, the overall retention ratios were as follows.[1]

After the first year	78.28 per cent
After the second year	51.70 per cent
After the third year	36.62 per cent
After the fourth year	25.93 per cent
After the fifth year	14.49 per cent
After the sixth year	6.64 per cent
After the seventh year	2.42 per cent
After the eighth year	0.72 per cent

Keeping the same assumption regarding repeaters, and using the same grade progression ratios and percentages of repeaters by grade as shown in table IV-11 and IV-12, we shall follow each of the cohorts starting in grade 1 during the period 1952 to 1959 until the year 1960, which is as far as our available data could take us. The results are shown in table IV-21, where each line represents the experience of one cohort. The cohort of 1952 has been followed for nine years; that of 1959, only two. The average experience of the eight different cohorts is summarized in the second line from the bottom of the table.[1]

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[1] Compared with the retention ratios obtained for the 1955 cohort, these results show a higher degree of school retention on the whole; and because we have followed the progress of the cohort over a longer period of time, we have discovered that even after the eighth year, almost 1 per cent of the original cohort could still be found in school. This is most likely a direct result of our assuming the possibility of third-time repeaters in the first two grades. If we had limited repeaters to no more than twice in any grade, we would probably have exhausted our cohort after the seventh year.

For our purpose, as will be clear presently, we prefer not to use these average ratios, but to take the respective ratio of the latest cohort in each column. These figures are reproduced in the last line of table IV-21. If our assumptions are valid, by applying these ratios to the actual numbers of new pupils in grade 1 of the respective years, and adding in the entire cohort of new pupils in grade 1 for 1960, we should be able to obtain the total enrolment in all grades for 1960. Let us see how it works.

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[1] Note that each average percentage ratio is based on a different number of cohorts: eight for the first, seven for the next, and so on. The last figure in this line is simply the experience of one cohort, that of 1952.

From the cohort of new pupils in grade 1: Year	Number	Take the following percentages:	We obtain the number of pupils remaining in 1960:
1952	351 001	0.72	2 527
1953	393 078	2.27	8 923
1954	414 219	6.33	26 220
1955	454 820	14.41	65 540
1956	474 818	26.79	127 204
1957	488 602	37.36	182 542
1958	540 745	50.85	274 969
1959	553 573	74.50	412 412
1960	578 740	100.00	578 740
		Total	1 679 077

Table IV-21 Colombia: *School retention ratios in all primary schools, 1952-1960*

(Percentage ratios)

Cohort of new pupils in grade 1 of year	Percentage of cohort remaining in school after:							
	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years
1952	78.28	51.70	36.62	25.93	14.49	6.64	2.42	0.72
1953	71.64	49.49	34.32	24.64	13.97	6.20	2.27	...
1954	73.44	49.35	34.78	25.49	14.27	6.33	...	...
1955	71.44	48.47	34.62	25.81	14.41	...	...	...
1956	71.89	49.32	35.21	26.79	...	...	...	...
1957	73.01	49.82	37.36	...	...	...	...	...
1958	70.71	50.85	...	...	...	...	...	...
1959	74.50	...	...	...	...	...	...	...
Average cohort:								
1952-1959	*73.11*	*49.86*	*35.48*	*25.73*	*14.28*	*6.39*	*2.35*	*0.72*
Latest cohort:								
1952-1959	*74.50*	*50.85*	*37.36*	*26.79*	*14.41*	*6.33*	*2.27*	*0.72*

Compared with the total enrolment reported for 1960, which is 1 690 361, our reconstructed total is short by less than 1 per cent.[1] This small discrepancy, due partly to inevitable errors of rounding and partly to our assumptions concerning repeaters, need not deter us from using the results of our cohort analysis for the purpose of estimating future school enrolment.[2]

Here we must pause to make some other necessary assumptions. We find that the cohort of new pupils in grade 1 has increased steadily from 351 000 in 1952 to 579 000 in 1960 (see Table IV-10). The annual increase in the size of the new cohort has varied between 13 000 and 52 000, averaging 28 000 over the period 1952-1960. Since the total number of children 5-9 years of age, according to available estimates (see Table IV-33), has increased some 60 000 each year, this means that the increase in the annual cohort of new pupils had absorbed almost up to 50 per cent of the increase in the population 5-9 years of age. This was possible only by taking into the cohort of new pupils, children who were above or below normal age, as well as those who were at the normal age for beginning primary school. As time goes on, we assume that there would be less and less of the over-aged children deprived of their opportunity to enter primary school at the proper time. Hence the proportion of the additionnal children to be absorbed by the cohort of new pupils would decrease rather than increase, until such time when practically all the children in the cohort of new pupils would be approximately at the normal age for beginning primary school. For this reason we shall assume that each cohort of new pupils between 1961 and 1966 will continue to increase by 25 000 each year; between 1966 and 1971 by an average of 20 000 each year; between 1971 and 1976 by 15 000 each year; and between 1976 and 1981 by 10 000 each year.

Furthermore, we shall assume that the school retention ratios would remain substantially unchanged for the next five years.[3] On the basis of these assumptions, we arrive at estimates of total primary school enrolment for each of the years 1961-1965, as shown in Table IV-22.

The first column of Table IV-22 gives the year, and the second column the size of each cohort of new pupils in grade 1 which are taken into consideration in our estimates. The succeeding columns show the percentage retention ratio applied to each respective cohort, and the resulting number of pupils expected to be remaining in school. This operation is carried out for each of the years 1961-1965. The sums of the numbers, which appear in the last line of the table, are our estimates of the total primary school enrolment for these respective years.

Taking the year 1961, for example, we first apply a ratio of 10 per cent, which comes from adding up the small percentage ratios (0.72 + 2.27 + 6.33) and rounding upwards, to the average size of the cohorts 1953, 1954 and 1955. That gives us an estimated 42 000 pupils from those particular cohorts remaining in 1961. Then we apply the ratio 15 (rounded up from our computed ratio of 14.41) to the cohort of 1956, which gives us 71 000 pupils. The next number, 132 000, comes from applying a ratio of 27 (rounded up from 26.79) to the 1957 cohort; and so on. The sum of the numbers (1 772 000) represents our estimate of the total primary school enrolment in 1961.

Before we proceed with further estimates for the period 1966-1981, we must make some additional assumptions concerning future school retention ratios. Without entering into discussions about school policies regarding pupil wastage in the form of drop-outs and repeaters, we would assume that the school authorities would undoubtedly wish to achieve the goal of reaching maximum retention ratios as soon as possible. We shall therefore assume a gradual increase of grade retention ratios from the present level of 70-80 to a goal of 95 by 1981, if not earlier. On the other hand, we shall assume a reduction of grade 5 repeaters from the present level of about 10 per cent to a goal of 5 per cent by 1976 or earlier. (see Table IV-23).

Under these additional assumptions we may estimate future school retention ratios to increase progressively as shown in Table IV-24. It is implicit in our assumptions that by 1981, if not earlier, there would be no more than 5 per cent of pupils who drop out of school at any grade level (including drop-outs due to death, mental and physical incapacity, and any other causes).

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1. If we had started with the total grade 1 cohort of 1952, instead of new pupils only (which would have been theoretically more correct), our result would have come to 1 679 914 - still about 10 000 below the reported enrolment in 1960.
2. If the discrepancy had been substantially larger, we would have been obliged to re-examine our basic data and assumptions, and to modify as may be necessary our computed retention ratios.
3. To save space and computational work, we shall use only rounded percentages and, in addition, we shall add together the small percentages to be applied to cohorts farthest back from the year for which we are going to make our estimates. By rounding each percentage ratio *upward*, we have in fact introduced a slight adjustment in view of the small discrepancy noted above.

Table IV-22 Colombia: *Estimated enrolment in all primary school, 1961-1965*

(Thousands of pupils)

Cohort of new pupils in grade 1		Pupils from each cohort remaining in school									
		1961		1962		1963		1964		1965	
Year	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number
1953	393	.	.	.	.	.	.	.	.	.	.
1954	414	.	.	.	.	.	.	.	.	.	.
1955	455	.	.	.	.	.	.	.	.	.	.
Average:											
1953-1955	(421)	*10*	42	.	.	.	.	.	.	.	.
1956	475	*15*	71	.	.	.	.	.	.	.	.
Average:											
1954-1956	(448)	.	.	*10*	45	.	.	.	.	.	.
1957	489	*27*	132	*15*	73	.	.	.	.	.	.
Average:											
1955-1957	(473)	.	.	.	.	*10*	47	.	.	.	.
1958	541	*38*	206	*27*	146	*15*	81	.	.	.	.
Average:											
1956-1958	(501)	.	.	.	.	.	.	*10*	50	.	.
1959	554	*51*	283	*38*	211	*27*	150	*15*	83	.	.
Average:											
1957-1959	(528)	.	.	.	.	.	.	.	.	*10*	53
1960	579	*75*	434	*51*	295	*38*	220	*27*	156	*15*	87
1961	*604	*100*	604	*75*	453	*51*	308	*38*	230	*27*	163
1962	*629	.	.	*100*	629	*75*	472	*51*	321	*38*	239
1963	*654	.	.	.	.	*100*	654	*75*	491	*51*	334
1964	*679	.	.	.	.	.	.	*100*	679	*75*	509
1965	*704	.	.	.	.	.	.	.	.	*100*	704
Total estimated enrolment:			1 772		1 852		1 932		2 010		2 089

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* Estimated.

Table IV-23 Colombia: *Assumed grade retention ratios in all primary schools, 1961 to 1981 and after, by period and grades.*

(Percentage ratios)

Period	Assumed retention ratio between grades				Repeaters grade 5
	1 and 2	2 and 3	3 and 4	4 and 5	
1961-1965	75	70	80	80	10
1966-1970	80	75	80	80	10
1971-1975	85	80	85	85	10
1976-1980	90	85	90	90	5
1981 and after	95	95	95	95	5

Table IV-24 Colombia: *Assumed school retention ratios in all primary schools, 1961 to 1981 and after, by period and years*

(Percentage ratios)

Cohort of new pupils in grade 1 of each year during period	Assumed percentage of pupils remaining in school after					
	One year	Two years	Three years	Four years	Five years	Six years or more
1961-1965	75	51	38	27	15	10
1966-1970	80	60	48	38	10	5
1971-1975	85	68	58	49	5	-
1976-1980	90	77	69	62	5	-
1981 and after	95	90	86	82	4	-

Now, using the same technique as before, we apply these assumed retention ratios to our estimated cohorts of new pupils in grade 1 each year from 1961 to 1981, and arrive at estimates of total enrolment in primary schools for 1966, 1971, 1976 and 1981. (See table IV-25)

Thus far we have dealt with all primary schools together, both public and private, urban and rural. We might have worked out separately the school retention ratios for urban and rural schools, since we would expect the cohort experiences to be distinctly different between the urban and rural schools. However, even though the primary school is of five years' duration, more than half of the urban schools provide less than five years of schooling, and all but a few of the rural schools, only up to 2 or 3 years of instruction. Hence there must be a large number of pupils who transfer from one type of school to the other during the course of their primary schooling. Furthermore, the distribution of the total population of the country between urban and rural areas will certainly be changing during the next 20 years. We have therefore not attempted to make independent estimates of urban and rural school enrolment separately.

Nevertheless, we note from table IV-3 that the proportion of total primary school enrolment in urban schools has steadily increased from 49 per cent in 1946 to 62 per cent in 1960. On the assumption that this proportion could still increase to about 64 per cent by 1976 and remain at that level until 1981, we can distribute our estimated primary school enrolment for the entire country according to these proportions and arrive at some tentative estimates as follows (in thousands of pupils): [1]

Year	Estimated total enrolment in all primary schools	Assumed percentage in urban schools	Estimated enrolment in urban schools	Estimated enrolment in rural schools
		%		
1961	1 772	62	1 099	673
1962	1 852	62	1 148	704
1963	1 932	62	1 198	734
1964	2 010	62	1 246	764
1965	2 089	62	1 295	794
1966	2 173	63	1 369	804
1971	2 723	63	1 715	1 008
1976	3 207	64	2 052	1 155
1981	3 771	64	2 413	1 358

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[1] In these estimates, the assumed percentage of enrolment in urban schools has been arbitrarily held to a very modest rise, from 62 to 64 per cent, in order to provide for a larger emphasis on the development of rural schools.

Table IV-25 Colombia: *Estimated enrolment in all primary schools, 1966, 1971, 1976, and 1981*

(Thousands of pupils)

Estimated cohort of new pupils in grade 1		Pupils from each cohort remaining in school							
		1966		1971		1976		1981	
Year	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number
1961	604	*25*	151	.	.	.	.	.	.
1962	629	*27*	170	.	.	.	.	.	.
1963	654	*38*	249	.	.	.	.	.	.
1964	679	*51*	346	.	.	.	.	.	.
1965	704	*75*	528	.	.	.	.	.	.
1966	729	*100*	729	*15*	109	.	.	.	.
1967	753	.	.	*38*	286	.	.	.	.
1968	775	.	.	*48*	372	.	.	.	.
1969	795	.	.	*60*	477	.	.	.	.
1970	813	.	.	*80*	650	.	.	.	.
1971	829	.	.	*100*	829	*5*	41	.	.
1972	844	.	.	.	.	*49*	414	.	.
1973	859	.	.	.	.	*58*	498	.	.
1974	874	.	.	.	.	*68*	594	.	.
1975	889	.	.	.	.	*85*	756	.	.
1976	904	.	.	.	.	*100*	904	*5*	45
1977	914	.	.	.	.	.	.	*62*	565
1978	924	.	.	.	.	.	.	*69*	638
1979	934	.	.	.	.	.	.	*77*	719
1980	944	.	.	.	.	.	.	*90*	850
1981	954	.	.	.	.	.	.	*100*	954
Total estimated enrolment:			2 173		2 723		3 207		3 771

Similarly, if we assume that the proportion of total enrolment in public primary schools will remain approximately at the present level of 85 per cent (leaving 15 per cent in private schools), we can distribute our estimated total enrolment as between public and private schools in the following tentative manner (in thousands of pupils): [1]

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[1] We have no intention of suggesting either the maintenance or the changing of the proportional distribution between public and private school enrolment in Colombia. The present exercise is merely for purposes of illustration.

Year	Estimated total enrolment in all primary schools	Assumed percentage in public schools	Estimated enrolment in public schools	Estimated enrolment in private schools
		%		
1961	1 772	85	1 506	266
1962	1 852	85	1 574	278
1963	1 932	85	1 642	290
1964	2 010	85	1 708	302
1965	2 089	85	1 776	313
1966	2 173	85	1 847	326
1971	2 723	85	2 315	408
1976	3 207	85	2 726	481
1981	3 771	85	3 205	566

In the last section of this chapter we shall apply some tests to see if our various estimates are reasonable. For the moment let us turn our attention to the second level of education dealing first with general secondary schools, then the teacher training schools, and finally the vocationals schools.

Unlike the situation with the primary school enrolment, we are handicapped in not having available the number of repeaters in the general secondary schools.There are data on the number of pupils who sat for examinations and those who passed these examinations at the end of each year of study, but even these figures are not distributed by year of study except for the years 1957-1960. In any case, we can only estimate approximately the school retention ratios from the grade retention ratios between years of study as found in table IV-20. Under an assumption that the number of repeaters are fairly constant from one year of study to the next, we can compute approximate school retention ratios by following a cohort of pupils in their first year of study in 1952 through their second year of study in 1953, and so on. Because there is substantial difference in the experience of male and female pupils, we shall work out retention ratios separately for the two sexes.

Table IV-26 gives the approximate retention ratios thus obtained for seven different cohorts of each sex who began their first year of study during the years 1953-1959. The last two lines sum up the experience of a number of cohorts, varying from seven to three. We have the choice of either using these average ratios, or the ratios of the latest cohorts in each column. Another alternative would be to use the average ratios of the three latest cohorts in each column. Since all these ratios in table IV-26 are approximate in nature, we shall simply take the average ratios as given in the last two lines of the table, and proceed to apply them in making our estimates of the future enrolment in all general secondary schools. We shall assume that the annual cohort of pupils in their first year of study will increase by, 5 000 male and 3 000 female pupils each year between 1961 and 1966; and will further increase by 6 000 male and 4 500 female pupils each year until 1971; by 7 000 male and 6 000 female pupils each year until 1976; and by 8 000 male and 7 000 female pupils each year until 1981.[1] The results, rounded to the nearest hundred, are shown in table IV-27.

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[1] As elsewhere in this chapter, these assumptions are made for illustrative purposes only. It is implied that the difference between the sexes regarding access to general secondary schools will tend to decrease, though not disappear altogether.

Table IV-26 Colombia: *Approximate school retention ratios in all general secondary schools, by sex, 1953-1960*

(Percentage ratios)

Cohort of pupils in first year of study	Sex	Assumed percentage of pupils remaining after				
		1 year	2 years	3 years	4 years	5 years
1953	Male	70.00	57.83	57.01	47.36	39.89
	Female	56.57	43.95	32.59	21.77	18.27
1954	Male	73.06	69.89	63.11	49.98	44.48
	Female	73.36	55.70	47.15	28.31	22.25
1955	Male	85.70	76.27	63.37	54.22	43.56
	Female	75.52	64.89	46.53	27.44	23.38
1956	Male	76.76	63.05	56.84	45.93	...
	Female	80.22	61.40	45.91	29.48	...
1957	Male	71.59	62.88	53.87	...	...
	Female	73.41	56.84	43.99	...	...
1958	Male	78.25	65.27	...	...	...
	Female	73.93	57.25	...	...	...
1959	Male	74.29	...	...	...	...
	Female	77.49	...	...	...	...
Average cohort:	Male	*75.66*	*65.87*	*58.84*	*49.37*	*42.64*
	Female	*72.93*	*56.67*	*43.23*	*26.75*	*21.30*

Again, before we continue with our estimates for future years after 1965, we shall adopt certain assumptions regarding retention ratios such that by 1981 or earlier, they would be 95 for both sexes as between one year of study and the next (see table IV-28). Based on such assumptions, we arrive at the assumed percentage of each cohort remaining in school after one up to five years (see table IV-29). We have made no explicit provision for pupils to repeat their last year of study after the sixth year in school, though it would not have made any substantial difference to our final estimates of future enrolment, because the number of such repeaters would have been rather small.

Table IV-30 presents our estimates of future enrolment in all general secondary schools for 1966, 1971, 1976 and 1981, showing how these estimates were obtained.

Thus far have explained and illustrated the method of estimating future school enrolment by the use of school retention ratios, as applied to the available data relating to primary schools and to general secondary schools. In order to estimate the future enrolment in teacher training schools, it would be advisable to use a different approach, based on the number of teachers who will be required in future years in view of our estimated future enrolment in primary schools. Attention must be given also to the requirement of new teachers to replace those leaving the teaching service through death, retirement, resignation and other causes.

Table IV-27 Colombia: *Estimated enrolment in all general secondary schools, 1961-1965, by year and sex of pupils*

(Thousands of pupils)

Cohort of all pupils in the first year of study		Sex	Pupils remaining in school during school year									
			1961		1962		1963		1964		1965	
Year	No.		%	No.	%	No.	%	No.	%	No.	%	No.
1956	19.8	Male	*43*	8.5	.	.	.	.	.	.	.	.
	10.8	Female	*21*	2.3	.	.	.	.	.	.	.	.
1957	22.6	Male	*49*	11.1	*43*	9.7	.	.	.	.	.	.
	12.6	Female	*27*	3.4	*21*	2.6	.	.	.	.	.	.
1958	23.8	Male	*59*	14.0	*49*	11.7	*43*	10.2	.	.	.	.
	14.1	Female	*43*	6.1	*27*	3.8	*21*	3.0	.	.	.	.
1959	27.0	Male	*66*	17.8	*59*	15.9	*49*	13.2	*43*	11.6	.	.
	14.7	Female	*57*	8.4	*43*	6.3	*27*	4.0	*21*	3.1	.	.
1960	29.7	Male	*76*	22.6	*66*	19.6	*59*	17.5	*49*	14.6	*43*	12.8
	16.2	Female	*73*	11.8	*57*	9.2	*43*	7.0	*27*	4.4	*21*	3.4
1961	*34.6	Male	*100*	34.6	*76*	26.3	*66*	22.8	*59*	20.4	*49*	17.0
	*18.8	Female	*100*	18.8	*73*	13.7	*57*	10.7	*43*	8.1	*27*	5.1
1962	*39.6	Male	.	.	*100*	39.6	*76*	30.1	*66*	26.1	*59*	23.4
	*21.8	Female	.	.	*100*	21.8	*73*	15.9	*57*	12.4	*43*	9.4
1963	*44.6	Male	.	.	.	.	*100*	44.6	*76*	33.9	*66*	29.4
	*24.8	Female	.	.	.	.	*100*	24.8	*73*	18.1	*57*	14.1
1964	*49.6	Male	.	.	.	.	.	.	*100*	49.6	*76*	37.7
	*27.8	Female	.	.	.	.	.	.	*100*	27.8	*73*	20.3
1965	*54.6	Male	.	.	.	.	.	.	.	.	*100*	54.6
	*30.8	Female	.	.	.	.	.	.	.	.	*100*	30.8
Total estimated enrolment:		Male		108.6		122.8		138.4		156.2		174.9
		Female		50.8		57.4		65.4		73.9		83.1
		Both sexes		159.4		180.2		203.8		230.1		258.0

* Estimated

Table IV-28 Colombia: *Assumed grade retention ratios in all general secondary schools, 1961 to 1981 and after, by period and sex*

(Percentage ratios)

Period	Sex	Assumed retention ratios between years of study				
		I and II	II and III	III and IV	IV and V	V and VI
1961-1965	Male	80	90	90	85	90
	Female	75	80	75	65	85
1966-1970	Male	80	90	90	90	90
	Female	80	85	80	70	90
1971-1975	Male	85	90	90	90	90
	Female	85	85	85	80	90
1976-1980	Male	90	95	95	95	95
	Female	90	90	90	90	95
1981 and after	Male	95	95	95	95	95
	Female	95	95	95	95	95

Table IV-29 Colombia: *Assumed school retention ratios in all general secondary schools, 1961 to 1981 and after, by period and sex*

(Percentage ratios)

Cohort of pupils in first year of study		Assumed percentage remaining in school after				
Period	Sex	1 year	2 years	3 years	4 years	5 years
1961-1965	Male	80	72	65	55	50
	Female	75	60	45	29	25
1966-1970	Male	80	72	65	59	53
	Female	80	68	54	38	34
1971-1975	Male	85	77	69	62	56
	Female	85	72	61	49	44
1976-1980	Male	90	86	82	78	74
	Female	90	81	73	66	63
1981 and after	Male	95	90	86	82	78
	Female	95	90	86	82	78

Table IV-30 Colombia: *Estimated enrolment in all general secondary schools, 1966, 1971, 1976, and 1981, by sex*

(Thousands of pupils)

Cohort of pupils in the first year of study			Remaining in school (1966)		Cohort of pupils in the first year of study			Remaining in school (1971)	
Year	Sex	Number	%	No.	Year	Sex	Number	%	No.
1961	Male	35	*50*	18	1966	Male	60	*53*	32
	Female	19	*25*	5		Female	34	*34*	12
1962	Male	40	*55*	22	1967	Male	66	*59*	39
	Female	22	*29*	6		Female	38	*38*	14
1963	Male	45	*65*	29	1968	Male	72	*65*	47
	Female	25	*45*	11		Female	42	*54*	23
1964	Male	50	*72*	36	1969	Male	78	*72*	56
	Female	28	*60*	17		Female	46	*68*	31
1965	Male	55	*80*	44	1970	Male	84	*80*	67
	Female	31	*75*	23		Female	51	*80*	41
1966	Male	60	*100*	60	1971	Male	90	*100*	90
	Female	34	*100*	34		Female	56	*100*	56
Total enrolment (1971):	Male			209		Male			331
	Female			96		Female			177
	Both sexes			305		Both sexes			508

Cohort of pupils in the first year of study			Remaining in school (1976)		Cohort of pupils in the first year of study			Remaining in school (1981)	
Year	Sex	Number	%	No.	Year	Sex	Number	%	No.
1971	Male	90	*56*	50	1976	Male	125	*74*	93
	Female	56	*44*	25		Female	85	*63*	54
1972	Male	97	*62*	60	1977	Male	133	*78*	104
	Female	61	*49*	30		Female	92	*66*	61
1973	Male	104	*69*	72	1978	Male	141	*82*	116
	Female	67	*61*	41		Female	99	*73*	72
1974	Male	111	*77*	85	1979	Male	149	*86*	128
	Female	73	*72*	53		Female	106	*81*	86
1975	Male	118	*85*	100	1980	Male	157	*90*	141
	Female	79	*85*	67		Female	113	*90*	102
1976	Male	125	*100*	125	1981	Male	165	*100*	165
	Female	85	*100*	85		Female	120	*100*	120
Total enrolment (1981):	Male			492		Male			747
	Female			301		Female			495
	Both sexes			793		Both sexes			1 242

The number of pupils we have estimated to be enrolled in primary schools during the 1961-1981 period are as follows: (1961) 1 772 000; (1966) 2 173 000; (1971) 2 723 000; (1976) 3 207 000; (1981) 3 771 000. How many teachers will be needed in those years?

We find that the average ratio of pupils per teacher in all primary schools combined has descreased from 42 in 1946 to 38 in 1960. If we assume a further reduction in this ratio to 35 by 1976, we obtain the following estimates of the total number of teachers required for the given years: [1]

Year	Estimated total enrolment in primary schools	Assumed ratio of pupils per teacher	Estimated number of teachers in service
1961	1 772 000	38	46 600
1966	2 173 000	37	58 700
1971	2 723 000	36	75 600
1976	3 207 000	35	91 600
1981	3 771 000	35	107 000

Therefore, for each of the five-year periods between those dates, the number of additional teachers required to meet the needs of increased enrólment may be estimated as follows:

Period	Number of additional teachers required during period	Average number of additional teacher required each year
1961-1966	12 100	2 400
1966-1971	16 900	3 400
1971-1976	16 000	3 200
1976-1981	16 100	3 200

In addition, there will be needed a certain number of new teachers each year to replace those who will be leaving the service through death, retirement, resignation and other causes. Let us assume that the average net length of service of a primary school teacher is ten years. This implies an annual replacement of 10 per cent of the teachers in service. Applying this replacement ratio to the estimated total teaching staff during the periods under discussion, we obtain:

Period	Average number of teachers in service	Average number of teachers required for replacement
1961-1966	53 000	5 300
1966-1971	67 000	6 700
1971-1976	84 000	8 400
1976-1981	100 000	10 000

Adding together these two requirements, we may estimate the total number of new teachers needed, on the average, during those periods, as follows:

Period	Average annual requirement for new teachers		
	To meet the increase in primary school enrolment	For replacement of teachers leaving the service	Total
1961-1966	2 400	5 300	7 700
1966-1971	3 400	6 700	10 100
1971-1976	3 200	8 400	11 600
1976-1981	3 200	10 000	13 200

Since it takes from four to six years to train a primary school teacher in the teacher training schools, we have to anticipate the above teacher requirements by an average of five years, to arrive at estimates of the necessary enrolment in teacher training schools. We have found earlier, in our analysis of of basic data, that the annual output of the teacher training schools has represented about 18 per cent of the training school enrolment five years before. This implies that there were on the average about 5.5 teachers in training in a given year to produce 1 trained teacher five years later.

Now this ratio of 5.5 trainees per teacher output is based on the combined data for two types of teacher training schools – the six-year higher teacher training schools and the four-year rural teacher training schools. In the next 20 years, it would be reasonable to assume that the standards of the rural teacher training schools would be raised to at least five or even six years. Therefore the ratio of trainees per teacher output may be estimated to rise from 5.5 to at least 6.0, say after 1965, and to 6.5 after 1975. Thus we can estimate the future enrolment in teacher training schools by applying these trainee / output ratios to the required number of new teachers each year during each five-year period, as follows:

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1. It should be borne in mind that with further development of primary schools, especially in urban areas, the average pupil teacher ratio may in fact increase, but this would tend to be offset by the generally lower ratios in rural areas.

Period	Average annual number of new teachers required	Assumed ratio of trainees per teachers output	Period	Required average enrolment in teacher training schools
1961-1966	7 700	5.5	1956-1961	42 000
1966-1971	10 100	5.5	1961-1966	56 000
1971-1976	11 600	6.0	1966-1971	70 000
1976-1981	13 200	6.0	1971-1976	79,000

To estimate the average enrolment needed in teacher training schools during the 1976-1981 period we have to make some further assumptions. Supposing that the total number of teachers required in 1986 will be something like 122 700, due to further increase in primary school enrolment and/ or further reduction of the pupils per teacher ratio. This would mean an average annual requirement of about 14 500 new teachers (3 000 to meet the increase in enrolment; 11 500 for replacement). With an assumed ratio of 6.5 trainees per teacher output, the required average enrolment in teacher training schools for the 1976-1981 period will be about 94 000.

The actual enrolment in all teacher training schools has increased from 8 600 in 1953 to 28 000 in 1960, the average enrolment during the 1956-1960 period being 20 400. Obviously the expected output of new teachers during the next five years will not meet anticipated requirements as we have estimated them. We can suppose that the shortage will be made up by the recruitment of persons other than graduates of teacher training schools.

Even for the next five-year period, 1961-1965, it is difficult to envisage increasing the enrolment in teacher training schools fast enough to meet the requirement for new teachers for the period beginning in 1966. However, by rapidly expanding the teacher training schools between 1966 and 1970, it would be possible to envisage these schools producing enough trained teachers needed from 1971 onward. Under these assumptions we make the following estimates of total enrolment in teacher training schools for the period 1961-1981:

(1961)	32 000	(1966)	65 000
(1962)	37 000	(1971)	85 000
(1963)	43 000	(1976)	90 000
(1964)	50 000	(1981)	95 000
(1965)	58 000		

We have now estimated future enrolment in all primary schools, in general secondary schools and in teacher training schools, for the period 1961-1981. For all types of vocational secondary schools, which are quite heterogeneous by nature and subject to changing conditions of supply and demand, we shall not attempt to make separate estimates of enrolment for each type of school. We shall use a simple expedient for estimating approximately the total enrolment in all types of vocational schools by assuming a constant relationship between vocational school enrolment and the total enrolment of all schools at the second level of education.

From data available for the period 1951-1960, we discover that the enrolment in all vocational schools has constituted between 32 and 41 per cent of all enrolment at the second level (see table IV-38). Assuming that this proportion will remain approximately at one-third for the entire period 1961-1981, we can add up our estimates for general secondary schools and teacher training schools for each given year, divide the sum by 2, and consider the result as our estimate of enrolment for all vocational schools taken together.

Finally, we arrive at our estimates of enrolment for all schools at the second level of education by taking the sum of our estimates for the three broad types of education in this level (see table IV-31).

Table IV-31 Colombia : *Estimated enrolment at the second level of education, by type, 1961-1981*

Year	Estimated enrolment in general secondary schools	Estimated enrolment in teacher training schools	Estimated enrolment in vocational secondary schools	Estimated total enrolment in all schools at the second level of education
	(a)	(b)	(c) = (a) + (b) ÷ 2	(d) = (a) + (b) + (c)
1961	159 000	32 000	96 000	287 000
1962	180 000	37 000	108 000	325 000
1963	204 000	43 000	124 000	371 000
1964	230 000	50 000	140 000	420 000
1965	258 000	58 000	158 000	474 000
1966	305 000	65 000	185 000	555 000
1971	508 000	85 000	297 000	890 000
1976	793 000	90 000	442 000	1 325 000
1981	1 242 000	95 000	669 000	2 006 000

Let us now put together the results of our estimates of future school enrolment in Colombia, at the first and second levels of education, for each of the years 1961-1965 and at five-year intervals from 1966 to 1981. This is shown in table IV-32, and in graphic form in chart IV-1.

Table IV-32 Colombia: *Estimated enrolment of pupils at the first and second levels of education, by level and type of education, 1961-1981.*

(Thousands of pupils)

Year	Estimated enrolment at first level: all primary schools	Estimated enrolment at second level			Estimated total enrolment at first and second level
		General secondary schools	Teacher training schools	Vocational secondary schools	
1961	1 772	159	32	96	2 059
1962	1 852	180	37	108	2 177
1963	1 932	204	43	124	2 303
1964	2 010	230	50	140	2 430
1965	2 089	258	58	158	2 563
1966	2 173	305	65	185	2 728
1971	2 723	508	85	297	3 613
1976	3 207	793	90	442	4 532
1981	3 771	1 242	95	669	5 777

4. TESTING THE ENROLMENT ESTIMATES

It remains for us to test the consistency and reasonableness of our enrolment estimates by comparing them with estimates of population in the relevant age groups and other pertinent data. The conscientious technician will not fail to note any inconsistency, discrepancy or unlikelihood shown up by these comparisons. He will then re-examine both his estimates and the other data used for comparison, and come to some conclusion as to whether he should revise or modify his estimates accordingly.

In the present case we shall make use of a set of population estimates for Colombia prepared by the Secretariat of the United Nations Economic Commission for Latin America, covering the total population, by urban and rural areas and distributed by sex and age groups. We shall extract from these estimates those segments relating to population in three age groups: 5-9, 10-14 and 15-19 years of age. These estimates are shown in table IV-33.

Table IV-33 Colombia: *Estimated population 5-19 years of age, 1951-1981, by urban and rural areas, sex and age groups*

(Thousands of persons)

Year	Area	Male			Female		
		5-9	10-14	15-19	5-9	10-14	15-19
1951	Urban	268	229	208	271	260	271
	Rural	540	447	371	511	407	340
	Total	808	676	579	782	667	611
1956	Urban	361	294	292	399	333	354
	Rural	614	499	371	549	433	300
	Total	975	793	663	948	766	654
1961	Urban	492	389	360	520	462	427
	Rural	636	570	419	571	471	326
	Total	1 128	959	779	1 091	933	753
1966	Urban	631	518	459	651	580	556
	Rural	638	594	486	576	496	362
	Total	1 269	1 112	945	1 227	1 076	918
1971	Urban	787	656	591	801	712	680
	Rural	647	598	507	583	501	382
	Total	1 434	1 254	1 098	1 384	1 213	1 062
1976	Urban	982	814	734	991	872	819
	Rural	675	605	507	607	500	382
	Total	1 657	1 419	1 241	1 598	1 372	1 201
1981	Urban	1 230	1 013	899	1 234	1 066	989
	Rural	720	630	507	642	521	375
	Total	1 950	1 643	1 406	1 876	1 587	1 364

Source: United Nations. Economic Commission for Latin America. Secretariat paper entitled: "Proyección de la población urbana, población rural y fuerza trabajadora de Colombia", (5 de abril de 1960), appendix tables II and IV.

The first test we shall apply to our estimates of school enrolment is to compare them with the available estimates of population in the relevant age groups. We shall relate our estimates of primary school enrolment to the population 5-14 years of age; our estimates of enrolment at the second level to the population 15-19 years of age; and our estimates of total enrolment at the first and second levels to the population 5-19 years of age. This we shall do also with actual observed or reported data for 1951 and 1956. The results of these comparisons, expressed in the form of school enrolment ratios, are given in table IV-34. We note a steady rise of the primary enrolment ratio from 30 in 1951 to 53 in 1981. A primary enrolment ratio of 53 implies that there will be 53 pupils enrolled in primary school for every 100 children 5-14 years of age. Since we have a five-year primary school on the one hand, and a ten-year age group of children on the other hand, such an enrolment ratio would seem plausible, if we suppose that, even by 1981, there will still be a certain amount of retardation resulting in over-aged pupils in the various grades of the primary school. (See tables IV-5 and IV-6 on the age distribution of pupils in 1960).

Table IV-34 Colombia: *Total school enrolment, by level of education, 1951 and 1956; and estimated 1961-1981, compared with estimated population 5-19 years of age*

(Thousands of persons and of pupils)

Year	Estimated population			Total school enrolment			School enrolment ratio		
	5-14	15-19	5-19	First level	Second level	First and second levels	Primary	Secondary	Total
Observed:									
1951	2 933	1 190	4 123	875	107	982	30	9	24
1956	3 482	1 317	4 799	1 312	181	1 493	38	14	31
Estimated:									
1961	4 111	1 532	5 643	1 772	287	2 059	43	19	36
1966	4 684	1 863	6 547	2 173	555	2 728	46	30	42
1971	5 285	2 160	7 445	2 723	890	3 613	52	41	49
1976	6 046	2 442	8 488	3 207	1 325	4 532	53	54	53
1981	7 056	2 770	9 826	3 771	2 006	5 777	53	72	59

Similarly, we find the secondary enrolment ratio going up from 9 in 1951 to 72 in 1981. This is because we have estimated total enrolment at the second level to increase about 20 times over the thirty-year period, whereas our estimates for primary school enrolment only imply a fourfold increase over the same period. This is shown graphically in chart IV-1, where we find the line showing second-level school enrolment sloping upward much more steeply than the primary enrolment line. Considering that we have schools at the second level varying in duration from 3 or 4 years to 6 or 7 years, and that we are comparing their enrolment with a five-year age group of population, we would conclude that an enrolment ratio of 72, which represents about 72 pupils for every 100 persons in that age group, is not unreasonably high. In fact, with a fully-developed secondary school system, and an average duration of five-years' schooling at this level, the ratio could rise to 100 or more if all persons 15-19 years of age, and some even beyond this age range, were to be enrolled in these schools.

Turning our attention more particularly to our estimates for enrolment in urban and rural primary schools, and comparing them to the estimated population 5-14 years of age in urban and rural areas, we find that our estimates imply an enrolment ratio for urban schools rising from 44 in 1951 to 59 in 1961, thereafter dropping to 53 in 1981. On the contrary, we envisage a rapid increase of the rural enrolment ratio from 22 in 1951 to 54 in 1981. This is a direct result of our assumption that by 1981 the enrolment in urban schools would constitute 64 per cent of the total primary school enrolment. This percentage would correspond with the estimated proportion of children 5-14 years of age living in urban areas by 1981. But table IV-35 shows strikingly that, according to this assumption, the children living in rural areas would no longer be under-privileged regarding primary education in 1981 as they were in 1951 or in 1956.

Table IV-35 Colombia: *Enrolment in all primary schools, by urban and rural schools, 1951 and 1956; and estimated 1961-1981, compared with estimated population 5-14 years of age*

(Thousands of pupils)

Year	Estimated population 5-14 years of age		Enrolment in all primary schools		Primary enrolment ratio	
	Urban	Rural	Urban	Rural	Urban	Rural
Observed:						
1951	1 028	1 905	457	418	44	22
1956	1 387	2 095	771	541	56	26
Estimated:						
1961	1 863	2 248	1 099	673	59	30
1966	2 380	2 304	1 369	804	58	35
1971	2 956	2 329	1 715	1 008	58	43
1976	3 659	2 387	2 052	1 155	56	48
1981	4 543	2 513	2 413	1 358	53	54

It will be recalled that we arrived at our estimates of primary school enrolment by assuming a certain increase in the annual cohort of new pupils starting in grade 1 each year. We find that the actual cohort of grade 1 new pupils in 1956 (numbering 475 000) was 25 per cent of the estimated population 5-9 years of age (1 923 000 children): Our estimates of beginning cohorts in 1961 and succeeding years would imply an increase of this proportion to 27 per cent in 1961; to 29 per cent in 1966-1971; then decreasing to 28 per cent in 1976 and to 25 per cent in 1981. If all pupils were to begin their primary schooling at the normal age 7.5 years, then possibly no more than 20 per cent of the children aged 5-9 would be expected to enter each new cohort. Any proportion above this percentage would be accounted for by some children beginning their primary schooling at an age either earlier or later than normal.

Our estimates of enrolment in general secondary schools, when compared with the estimated population 15-19 years of age, as shown in table IV-36, implies that each cohort of pupils in their first year of study will constitute a larger portion of the population 15-19 years of age, rising from 2.3 per cent in 1956 to 10.3 per cent in 1981. Total enrolment in these schools, which constituted only 7 per cent of the youth aged 15-19 in the 1950' s, is estimated to take in nearly 45 per cent of the youth population in 1981. We are also assuming a substantial improvement in the proportion of girls enrolled in these schools as compared with boys. Whereas in 1951, only 5 per cent of girls in the age group 15-19 years were enrolled in general secondary schools, as compared with about 10 per cent of boys, we envisage over 36 per cent of girls, as compared with 53 per cent of boys, to be enrolled in 1981. The continuing disparity between the sexes in this regard may be offset in part by the preponderance of girls enrolled in teacher training schools and in many of the vocational schools, as is the case at present (see tables IV-17 and IV-18).

Tables IV-37 compares the annual cohort of pupils in their first year of study in general secondary schools, with pupils completing grade 5 of primary school the year before, and with new pupils entering grade 1 of primary school five years earlier. Whereas our estimated cohort of pupils in their first year of secondary school, as percentage of those completing their primary schooling the year before, might decrease from 78 to 63 per cent, it is anticipated that the rest of the primary school graduates will go into other types of secondary schools (teacher training and vocational). Compared with new pupil cohorts estimated to begin their primary schooling in the same years, the proportion of those beginning their general secondary education is expected to increase rapidly from 11 per cent in 1961 to 32 per cent in 1981. This is one way to explain the steep rise in estimated secondary enrolment as compared with the more gradual increase in estimated primary school enrolment, as shown in table IV-34 and chart IV-1.

Table IV-36 Colombia: *Annual cohorts of pupils in the first year of study, and total enrolment in all general secondary schools, 1951 and 1956, and estimated 1961 - 1981, compared with estimated population 15 - 19 years of age, by sex*

(Thousands of persons and of pupils)

Year	Sex	Estimated population 15-19 years of age	Cohort of pupils in the first year of study		Total enrolment in all general secondary schools	
			Number	As percentage of population 15-19 years of age %	Number	As percentage of population 15-19 years of age %
Observed:						
1951	Male	579	...	...	56.6	9.8
	Female	611	...	...	32.9	5.4
	Both sexes	1 190	...	...	88.5	7.4
1956	Male	663	19.8	3.0	62.9	9.5
	Female	654	10.8	1.7	30.5	4.7
	Both sexes	1 317	30.6	2.3	93.4	7.1
Estimated:						
1961	Male	779	34.6	4.4	108.6	13.9
	Female	753	18.8	2.5	50.8	6.7
	Both sexes	1 532	53.4	3.5	159.4	10.4
1966	Male	945	60	6.3	209	22.1
	Female	918	34	3.7	96	10.5
	Both sexes	1 863	94	5.0	305	16.4
1971	Male	1 098	90	8.2	331	30.1
	Female	1 062	56	5.3	177	16.7
	Both sexes	2 160	146	6.8	508	23.5
1976	Male	1 241	125	10.1	492	39.6
	Female	1 201	85	7.1	301	25.1
	Both sexes	2 442	210	8.6	793	32.5
1981	Male	1 406	165	11.7	747	53.1
	Female	1 364	120	8.8	495	36.3
	Both sexes	2 770	285	10.3	1 242	44.8

Table IV-38 compares the relative development of the three types of education at the second level, as estimated for 1961-1981, with the actual situation during the 1951-1960 period. We note the increasing importance imputed to the general secondary schools in the future, with their portion of the total enrolment rising from 55 per cent in 1961 to 62 per cent in 1981, somewhat reversing the trend observed between 1951 and 1960 when the percentage of total enrolment in the general secondary schools fell from 60 to 55. On the other hand, we envisage the relative importance of teacher training schools at this level to achieve its maximum during the 1963-1966 period, thereafter declining gradually as the primary schools become more adequately staffed with trained teachers. The percentage of enrolment attributed to vocational schools has, of course, been arbitrarily kept at 33 per cent throughout the coming period.

We may now conclude that, under the various assumptions which have been stated, and based on such data as we have at hand, the estimates which we have made of future school enrolment in Colombia, at the first and the second levels of education seem fairly reasonable and consistent. As such, they might be useful to administrators for purposes of educational planning. It goes without saying that persons who may have more up-to-date and more recent data at their disposal, as well as intimate knowledge about the peculiar problems and national policies involved, could have done a better job as far as the numerical results are concerned. But we trust that the methods of estimating future school enrolment for a developing country, as illustrated in this chapter, may be more generally useful and applicable in many similar situations.

In the next chapter we shall offer another case study, based principally on the method of school attendance ratios and relying more directly on census and other types of demographic data. The study will concern the Philippines, and will call for estimating the future school enrolment over the period 1965-1981.

Table IV-37 Colombia: *Annual cohorts of pupils in the first year of study in general secondary schools 1957-1960, and estimated 1961-1981, compared with pupils completing primary school the previous year, and with new pupils entering primary school five years before*

(Thousands of pupils)

Cohort of new pupils in grade 1 of all primary schools		Pupils completing grade 5 of all primary schools		Cohort of pupils in the first year of study in general secondary schools			
Year	Number (a)	Year	Number (b)	Year	Number (c)	(c) as % of (b)	(c) as % of (a)
Observed:							
1952	351	1956	46.2	1957	35.2	76.2	10.0
1953	393	1957	52.3	1958	37.9	72.5	9.6
1954	414	1958	61.1	1959	41.7	68.2	10.1
1955	455	1959	67.3	1960	46.0	68.4	10.1
1956	475	1960	75.9	1961	•53.4	70.4	11.2
Estimated:							
1961	604	1965	121	1966	94	78	16
1966	729	1970	219	1971	146	67	20
1971	829	1975	332	1976	210	63	25
1976	904	1980	452	1981	285	63	32

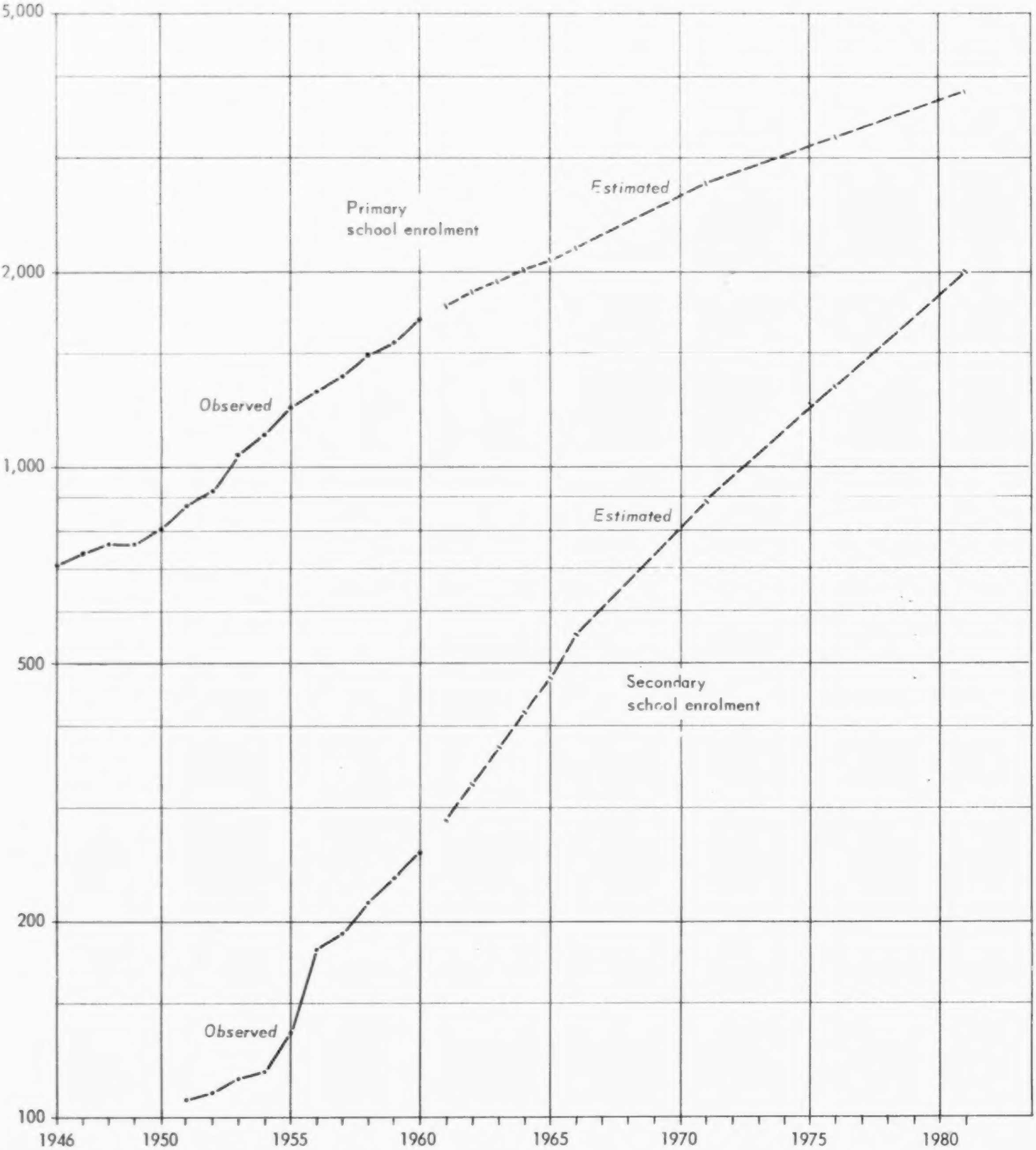
• Estimated

Table IV-38 Colombia: *Total enrolment at the second level of education, 1951-1960, and estimated 1961-1981, distributed by type of education*

(Thousands of pupils)

Year	Total enrolment at the second level of education	Enrolment in general secondary schools		Enrolment in teacher training schools		Enrolment in vocational secondary schools	
		Number	Per cent	Number	Per cent	Number	Per cent
Observed:							
1951	106.9	64.4	60	7.4	7	35.1	33
1952	109.7	65.2	59	7.8	7	36.7	34
1953	114.7	65.6	57	8.6	8	40.5	35
1954	117.6	69.9	59	9.9	8	37.8	32
1955	134.7	77.4	58	11.8	9	45.4	34
1956	180.9	93.3	52	14.3	8	73.3	41
1957	192.2	107.6	56	16.4	9	68.1	35
1958	214.6	115.0	54	19.1	9	80.4	38
1959	232.8	128.5	55	24.0	10	80.3	35
1960	253.8	140.3	55	28.0	11	85.4	34
Estimated:							
1961	287	159	55	32	11	96	33
1962	325	180	55	37	11	108	33
1963	371	204	55	43	12	124	33
1964	420	230	55	50	12	140	33
1965	474	258	54	58	12	158	33
1966	555	305	55	65	12	185	33
1971	890	508	57	85	10	297	33
1976	1 325	793	60	90	7	442	33
1981	2 006	1 242	62	95	5	669	33

Chart IV-1. Colombia: Total enrolment in primary and secondary schools, observed up to 1960; estimated 1961-1981



CHAPTER V

ESTIMATING FUTURE SCHOOL ENROLMENT FOR THE PHILIPPINES, 1965-1980

1. NATURE OF THIS CHAPTER

This chapter, like the previous one, will consist of a case study to illustrate methods of estimating future school enrolment. However, unlike chapter IV, where we showed how estimates of future school enrolment may be constructed mainly around school retention ratios based on the available school records concerning pupil enrolment by sex and grade, together with full information on repeaters by grade, here we shall illustrate the use of school attendance ratios, based on population census data on school attendance, which are available for some countries but not for others. Enrolment data available for the Philippines are not as adequate in detail as in the case of Colombia, so it would be difficult to work out grade-retention and school-retention ratios and to apply them for purposes of estimating future enrolment. But we do have, for the Philippines, census data on school attendance for two successive census years: 1948 and 1960, besides similar data from the Philippines Statistical Survey of Households, conducted in October 1956. Hence the method of estimating future school enrolment by the use of school attendance ratios would be particularly suitable in this case.

As before, we shall first make a preliminary analysis of available data pertinent to the study; then make provisional estimates based on these data; and conclude by testing the estimates for their consistency and reasonableness.

We have estimates of future population available for the years 1965, 1970, 1975 and 1980. Therefore we shall attempt future school enrolment estimates for these same years; that is, over a fifteen-year period, at five-year intervals. If desired, annual estimates, particularly for the first five-year period, could be obtained by interpolation.

2. ANALYSIS OF BASIC DATA

Data on school attendance of the population, by age and sex, according to the Censuses of 1948 and 1960, are puplished by the Bureau of the Census and Statistics.[1] From the detailed tables given in the Census reports we reproduce some figures relating to the population 6 to 17 years of age, separately for each sex, as shown in tables V-1 and V-2.

The data in table V-1 refer to school attendance at any time between 1 January and 1 October, 1948, and cover attendance both in public and private schools. It should be noted that the period covered by the census question on school attendance actually involved two school years - 1947-1948 and 1948-1949. Hence there might have been some overstatement of the number of children and youth attending school due to the way the question was formulated.

At the 1960 Census, which was taken on 1 February, the question was, "Did you attend school in 1959?" Again two school years were involved - the latter part of the school year 1958-1959 and the early part of the school year 1959-1960. The results of the 1960 Census seem to show a considerable *decrease* in the ratio of school attendance, for almost every sex and age group, particularly above the age of 13. (See table V-2).

Assuming that the accuracy of the figures is not in doubt, or is at least comparable between the two censuses, one plausible explanation of this phenomenon may be found in the fact that the earlier census was taken soon after the Second World War, and there must have been a tremendous backlog of children and youth who had been deprived of schooling during the war years who were then making up for lost time. However, as we shall see presently, this explanation might be plausible only as regards the decreasing school attendance ratio of those who were at least 6 or 7 years old at the end of the war, but could not apply to the generation of children born during and after the war.

This is shown more clearly when we look at the data on school attendance obtained from a sample survey of households in 1956, from which table V-3 has been derived.[2] A comparison of the three sets of ratios - from the 1948 Census, 1956 Survey and 1960 Census - is given in table V-4. From this comparison it appears that the extraordinarily high attendance ratios for the age groups 14-17 at the 1948 Census may have been due wholly or largely to the effect of delayed schooling, since they were already of school age during the war years. Children in the age groups 9-13 at the 1948 Census, who were also of school age during the war, probably included many who had missed school before, hence started late in school during the two school years covered by the 1948 Census. But the 6, 7 and 8-year old children at that census were not old enough to attend school during the war, yet a much larger percentage among them claimed to be attending school at that time, as compared with the children in the same age groups at the 1960 Census. Furthermore, all age groups from 6 to 11 years show higher attendance ratios from the 1956 Survey than either the Census of 1948 or the Census of 1960.

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[1] Republic of the Philippines. Bureau of the Census and Statistics. *Census of the Philippines 1948.* Summary of Population and Agriculture; *Census of the Philippines, 1960*: Population and Housing, Vol. II, Summary Report. Manila, 1954, 1963.

[2] For information concerning the Philippines Statistical Survey of Households, and discussion of educational requirements based on data from this source, see: United Nations. *Population growth and manpower in the Philippines*: a joint study by the United Nations and the Government of the Philippines. (U.N. document ST/SOA/Series A/No.32) New York, 1960.

Table V-1. Philippines : *Number and percentage of persons 6-17 years of age attending school, by age and sex, Census of 1948.*
(Thousands of persons)

Age	Male persons			Female persons		
	Total number	Attending school	Per cent	Total number	Attending school	Per cent
6	302	22	*7.2*	283	23	*8.2*
7	339	117	*34.6*	318	116	*36.6*
8	329	170	*51.6*	311	169	*54.2*
9	250	159	*63.6*	241	160	*66.4*
10	307	217	*70.5*	288	209	*72.3*
11	210	165	*78.9*	203	162	*79.9*
12	331	249	*75.3*	301	228	*75.9*
13	226	178	*78.5*	219	171	*77.9*
(7-13)	(1 992)	(1 255)	*(63.0)*	(1 881)	(1 215)	*(64.6)*
14	239	176	*73.5*	236	167	*70.6*
15	233	156	*67.1*	221	137	*62.1*
16	203	126	*62.0*	217	118	*54.4*
17	187	102	*54.4*	193	86	*44.7*
(14-17)	(862)	(560)	*(65.0)*	(867)	(508)	*(58.6)*

Source : Census of the Philippines, 1948 : *Summary of Population and Agriculture.*

Table V-2. Philippines : *Number and percentage of persons 6-17 years of age attending school, by age and sex, Census of 1960.*
(Thousands of persons)

Age	Male persons			Female persons		
	Total number	Attending school	Per cent	Total number	Attending school	Per cent
6	481	15	*3.2*	448	16	*3.7*
7	484	121	*25.0*	455	124	*27.3*
8	434	209	*48.2*	408	210	*51.5*
9	359	227	*63.1*	343	228	*66.4*
10	436	289	*66.3*	405	280	*69.0*
11	298	215	*72.0*	283	209	*74.0*
12	417	278	*66.7*	379	255	*67.2*
13	313	200	*63.9*	306	188	*61.5*
(7-13)	(2 743)	(1 540)	*(56.1)*	(2 579)	(1 494)	*(57.9)*
14	301	155	*51.7*	296	140	*47.3*
15	288	122	*42.2*	277	104	*37.5*
16	275	95	*34.5*	292	85	*29.2*
17	268	76	*28.2*	271	62	*22.7*
(14-17)	(1 132)	(448)	*(39.6)*	(1 136)	391	*(34.4)*

Source : Census of the Philippines, 1960. *Population and Housing,* vol. II : *Summary report.*

Table V-3 Philippines: *Number and percentage of persons 5-17 years of age attending school, by age and sex, Sample survey, 1956* (Thousands of persons)

Age	Male persons			Female persons		
	Total number	Attending school	Per cent	Total number	Attending school	Per cent
5	369	9	*2.3*	327	8	*2.5*
6	393	57	*14.5*	361	64	*17.7*
(5-6)	(762)	(66)	*(8.7)*	(688)	(72)	*(10.5)*
7	366	222	*60.5*	319	190	*59.6*
8	344	251	*73.1*	338	266	*78.6*
9	305	250	*82.1*	280	213	*76.3*
10	329	269	*81.8*	291	251	*86.3*
11	219	189	*86.6*	230	195	*84.7*
12	308	228	*74.0*	285	188	*65.8*
13	257	166	*64.5*	233	123	*52.8*
(7-13)	(2 128)	(1 575)	*(74.0)*	(1 976)	(1 426)	*(72.2)*
14	258	134	*52.2*	242	91	*37.7*
15	255	105	*41.2*	243	83	*34.2*
16	220	69	*31.3*	266	51	*19.2*
17	223	65	*29.0*	229	39	*17.2*
(14-17)	(956)	(373)	*(39.0)*	(980)	(264)	*(26.9)*

Source: Worksheets available to the United Nations Secretariat from the Philippines Statistical Survey of Households, October 1956.

Table V-4 Philippines: *Comparison of school attendance ratios for persons 6-17 years of age, by age and sex, from the Census of 1948, Sample survey of 1956, and Census of 1960*

Age	School attendance ratios					
	Male persons			Female persons		
	Census 1948	Survey 1956	Census 1960	Census 1948	Survey 1956	Census 1960
6	7.2	14.5	3.2	8.2	17.7	3.7
7	34.6	60.5	25.0	36.6	59.6	27.3
8	51.6	73.1	48.2	54.2	78.6	51.5
9	63.6	82.1	63.1	66.4	76.3	66.4
10	70.5	81.8	66.3	72.3	86.3	69.0
11	78.9	86.6	72.0	79.9	84.7	74.0
12	75.3	74.0	66.7	75.9	65.8	67.2
13	78.5	64.5	63.9	77.9	52.8	61.5
(7-13)	(63.0)	(74.0)	(56.1)	(64.6)	(72.2)	(57.9)
14	73.5	52.2	51.7	70.6	37.7	47.3
15	67.1	41.2	42.2	62.1	34.2	37.5
16	62.0	31.3	34.5	54.4	19.2	29.2
17	54.4	29.0	28.2	44.7	17.2	22.7
(14-17)	(65.0)	(39.0)	(39.6)	(58.6)	(26.9)	(34.4)

Source: Tables V-1, V-2 and V-3.

It has been stated that, owing to lack of school buildings after the war, about two-fifths of the primary grades and some of the intermediate grades were authorized to operate under a double-session plan whereby different groups of pupils were accommodated in half-day session – morning or afternoon – using the same classrooms.[1] This of course increased the capacity of existing schools and made it possible for the school enrolment to be substantially expanded without a corresponding increase in the number of schools. We do not know whether this emergency plan is still in operation, or whether it has affected the growth of school enrolment in primary and intermediate schools during the years between the two censuses.

Furthermore, we understand that the 1960 Census data on school attendance excluded persons enrolled in kindergarten, vocational, trade or business schools. Again, we do not know if such pupils were included or not in the 1948 Census, though we have reason to surmise that kindergarten pupils at least had been included. Still, even if all vocational school pupils had been included in the 1948 Census but excluded in 1960, this alone would not be enough explanation for the apparent drop in the attendance ratios of the 14-17 age groups, for the number of pupils enrolled in vocational schools, both public and private, has been less than 20 per cent in all the post-war years.

We are therefore driven to the conclusion that either the 1948 figures were too high, or the 1960 figures too low, for reasons which largely escape us. There remains the alternative that there had been a real downward trend in school enrolment between the two Census dates.

It should be noted that the data we have examined so far refer to "school attendance" and not to enrolment in any particular type or level of school. Enrolment statistics, by level of education and type of schools, are published by Unesco in the *World Survey of Education.* Tables V-5 and V-6 give enrolment figures in primary and secondary schools (public and private) for each year from 1950 to 1960.

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[1] Unesco. *World Survey of Education*, Vol. II, Primary education, p. 849.

Table V-5 Philippines : *Total enrolment in primary schools, public and private, by sex, 1950 - 1960*

(Thousands of pupils)

Year	Total primary school enrolment	Public	Private	Per cent private	Male	Female	Per cent Female
1950	4 083	3 931	152	3.7	...	...	...
1951	3 930	3 796	134	3.4	...	...	...
1952	3 583	3 439	145	4.0	1 879	1 705	48
1953	3 499	3 365	134	3.8	1 828	1 671	48
1954	3 443	3 304	139	4.0	1 805	1 638	48
1955	3 499	3 555	144	4.1	1 828	1 671	48
1956	3 674	3 519	154	4.2	1 926	1 748	48
1957	3 735	3 575	160	4.3	1 951	1 785	48
1958	3 970	3 801	169	4.3	2 074	1 897	48
1959	4 144	3 969	175	4.2	2 167	1 977	48
1960	4 197	4 001	196	4.7	2 192	2 005	48

Source : Unesco. Questionnaire returns for the *World Survey of Education.*
... *Information not available.*

Table V-6 Philippines : *Total enrolment in secondary schools, public and private, by sex, 1950 - 1960*

(Thousands of pupils)

Year	Total secondary school enrolment	Public	Private	Per cent private	Male	Female	Per cent female
1950	484	196	288	60	...	...	...
1951	609	212	397	65	...	...	...
1952	590	212	378	64	329	261	44
1953	625	221	404	65	348	277	44
1954	643	229	414	64	356	287	45
1955	628	219	409	65	348	280	45
1956	619	224	395	64	344	275	44
1957	633	225	408	64	349	283	45
1958	621	232	389	63	346	275	44
1959	644	239	405	63	351	293	46
1960	659	246	413	63	358	301	46

Source : Unesco. Questionnaire returns for the *World Survey of Education.*
... Information not available.

Total enrolment in primary schools had reached a fairly high level in 1950, from which there was an apparent recession until 1954, after which it began to increase again, but it was only in 1959 that the previous high level of enrolment was reached and surpassed. Considering that the number of children of primary school age in 1960 must be at least 30 per cent more than in 1950, these figures would tend to confirm the hypothesis suggested by the census data on school attendance that there may have been an actual regression during the decade of the fifties in the proportion of primary school-age children attending school.

As regards total enrolment in secondary schools, while the general trend has been more often upward than downward during the period in question, the net increase from 1950 to 1960 - amounting to about 36 per cent - was probably just enough to keep up with the increase in the population of secondary school-age. These facts should be kept in mind when we begin to estimate future school enrolment at these levels of education.

Private schools have accounted for less than 5 per cent of total primary school enrolment during this period, but more than 60 per cent of the total enrolment at the secondary level. The proportion of girls in primary schools has remained constant at about 48 per cent; it has increased from 44 to 46 per cent in secondary schools.

For public schools only, we have enrolment data going back to 1930, with the exception of four years during the war. These data are summarized in table V-7. Over a period of 30 years, public primary (including intermediate) schools increased their total enrolment from 1,144,000 to 4,001,000 at an average rate of 4.3 per cent per year. However, up to 1949, the previous high-water mark in primary school enrolment, the average annual rate of increase had been about 6.8 per cent. Enrolment in all public secondary schools grew from 75,200 in 1930 to 245,900 in 1960, at an average annual rate of 4 per cent. Again, up to 1949 the average annual growth rate had been 5.5 per cent; between 1949 and 1960 the average rate of increase was only 1.5 per cent per year. It should be borne in mind, however, that private schools at the secondary level, which account for nearly two-thirds of all secondary school enrolment, has in the last ten years shown a substantially higher rate of growth than the public secondary schools.

Table V-7 Philippines : *Enrolment trends in primary and secondary education (public schools only), 1930-1960*

(Thousands of pupils)

Year	Number of pupils enrolled in public schools				
	Primary and intermediate schools	General high schools	Vocational high schools	Teacher training schools [1]	All Secondary schools
1930	1 144	51.5	17.7	6.0	75.2
1931	1 135	43.3	17.6	6.0	66.8
1932	1 136	36.4	15.1	4.2	55.6
1933	1 121	34.7	15.6	2.5	52.8
1934	1 150	36.0	16.5	1.8	54.2
1935	1 181	40.9	16.9	1.3	59.1
1936	1 209	51.9	11.8	1.0	64.7
1937	1 424	55.2	18.2	0.7	74.1
1938	1 666	54.5	17.2	0.7	72.4
1939	1 850	65.6	23.2	0.8	89.6
1940	1 923	77.1	23.8	0.9	101.9
1945	2 388	138.3	17.2	0.3	155.8
1946	3 102	137.9	17.6	0.3	155.8
1947	3 357	150.1	18.0	0.3	168.9
1948	3 693	169.7	23.6	0.3	193.6
1949	3 960	179.1	28.3	0.3	207.7
1950	3 931	165.1	30.3	0.3	195.8
1951	3 796	162.9	30.7	0.3	193.9
1952	3 439	161.5	33.8	0.2	195.5
1953	3 365	179.7	41.2	0.1	221.0
1954	3 303	183.7	45.1	0.0	228.8
1955	3 355	176.2	42.7	-	218.9
1956	3 519	180.6	43.4	-	224.0
1957	3 575	181.5	43.1	-	224.6
1958	3 801	186.1	46.2	-	232.3
1959	3 969	193.1	46.0	-	239.1
1960	4 001	185.3	60.6	-	245.9

1. Teacher training schools at the secondary level were converted into collegiate teacher training schools after 1954.

Source : Unesco. *World Survey of Education*, Vol. II, Primary education ; Vol. III, Secondary education ; data for recent years from Unesco files.

Distribution of pupils by age, sex and grade, in public primary schools only, for 1952, is reproduced in table V-8, as published in the *World survey of education*, Volume II. It shows a fairly wide age range of pupils in every grade, from under 6 years in grade 1 to 15 years and over in grades 3 to 6. If we consider 7 years as the legal age for entering primary schools, and assume normal progression of one grade each year, the median age of pupils is generally 1 year or more higher than the normal age for each grade. The percentage of pupils 2 years or more above normal age ranges from 17 per cent in grade 1 to 35 per cent in grade 6, indicating a substantial amount of retardation, due probably in large part to the repetition of grades.

Table V-8 Philippines : *Age, sex and grade distribution of pupils in public primary and intermediate schools, 1952*

Age	Sex	Pupils by grade						
		1	2	3	4	5	6	Total
–6	M	487	–	–	–	–	–	487
	F	495	–	–	–	–	–	495
6	M	5 696	529	–	–	–	–	6 225
	F	5 750	481	–	–	–	–	7 231
7	M	212 230	5 229	535	–	–	–	217 994
	F	206 623	6 155	483	–	–	–	213 261
8	M	61 537	146 616	5 283	736	–	–	214 172
	F	52 993	148 917	6 416	856	–	–	209 182
9	M	30 374	63 497	120 194	5 519	894	–	220 478
	F	23 062	53 980	128 045	6 435	975	–	212 497
10	M	16 531	35 225	62 984	101 456	4 954	889	222 039
	F	11 970	28 002	56 576	111 852	5 929	1 032	215 361
11	M	8 852	20 017	38 785	54 966	74 125	4 036	200 781
	F	6 263	15 387	30 418	50 892	81 253	5 035	189 248
12	M	5 631	12 989	25 008	39 315	43 318	56 769	183 030
	F	3 779	9 306	18 760	32 428	39 806	60 164	164 243
13	M	5 148	7 408	14 851	25 574	28 963	34 037	115 981
	F	3 369	4 967	10 387	19 149	22 790	29 625	90 287
14	M	–	7 594	8 859	15 564	18 369	23 549	73 935
	F	–	4 761	5 821	10 869	13 307	17 637	52 395
15	M	–	–	9 383	19 413	25 272	38 243	92 311
	F	–	–	5 590	12 615	15 508	23 714	57 427
Total	M	346 486	299 104	285 882	262 543	195 895	157 523	1 547 433
	F	315 304	271 956	262 496	245 096	179 568	137 207	1 411 627
	MF	661 790	571 060	548 378	507 639	375 463	294 730	2 959 060
Median age								
	(M	7.8	9.0	10.3	11.4	12.4	13.5	.
	(F	7.7	8.9	10.0	11.1	12.0	13.1	.
	(MF	7.8	8.9	10.1	11.3	12.2	13.3	.
Normal age for grade		(7)	(8)	(9)	(10)	(11)	(12)	.
Percentage of pupils 2 years or more above normal age		17	26	31	34	33	35	28

Source: Unesco, *World Survey of Education*, II, Primary Education, p. 855.

For estimates of future population, we shall make use of population projections, by sex and age groups, prepared by the United Nations Secretariat prior to the Census of 1960.[1] Among the four alternative projections, based on different assumptions regarding future trends in fertility and mortality, we shall take the one labelled as "conservative". However, in the light of the results of the 1960 Census, which became available after we had begun the preparation of this chapter, it appears that these estimates are probably too conservative, and perhaps should be revised upwards.[2] Table V-9 gives the population estimates for age groups from 0 to 29 years, for the years 1965, 1970, 1975 and 1980, which are relevant to our present study.

Table V-9 Philippines: *Estimated population 0-29 years of age, by sex and five-year age groups, 1965 - 1980*
(Thousands of pupils)

Age group (years)	Estimated population at mid-year							
	1965		1970		1975		1980	
	Male	Female	Male	Female	Male	Female	Male	Female
0 – 4	2 938	2 862	3 453	3 362	4 092	3 980	4 893	4 756
5 – 9	2 349	2 292	2 775	2 708	3 286	3 206	3 922	3 824
10 – 14	1 943	1 894	2 310	2 252	2 735	2 668	3 245	3 166
15 – 19	1 745	1 586	1 909	1 859	2 275	2 217	2 699	2 632
20 – 24	1 371	1 294	1 700	1 545	1 865	1 818	2 229	2 175
25 – 29	1 117	1 139	1 328	1 255	1 653	1 504	1 820	1 777

Source: United Nations. *Future population estimates by sex and age,* Report III.

3. ESTIMATING THE FUTURE SCHOOL ENROLMENT

After these preliminaries, we shall start the process of making some reasonable estimates of future school enrolment in the Philippines, for the period 1965-1980. We must first, however, define the population of school age, with which we are specifically concerned. The national school system of the Philippines provides ten (or eleven) years of education below the college or university level: 4 years of elementary school (grades 1 to 4), followed by 2 or 3 years of intermediate school (grades 5 to 7), and 4 years of general or vocational high school. Teacher training schools, which were formerly at the secondary level, have recently been converted into collegiate normal schools, and so are not included in the present study. The 7th grade of the intermediate school, which had been abolished by the Education Act of 1940, was authorized to be restored by the Republic Act No. 896 of 1953, but we do not know to what extent this provision has been carried out.[3]

For purposes of the present study, we shall consider the population 7-13 years inclusive (a seven-year age group) as being of primary school age, and persons 14-17 years inclusive (a four-year age group) as being of secondary school age. In addition, we shall also take into consideration children 5 and 6 years of age, since a substantial number of them are already attending primary schools though they are not required to do so. We shall designate this age group as being of pre-school age.

In order to have a rough idea of the order of magnitude of these respective age groups, we might take a first approximation based on the estimates in five-year age groups shown in table V-9. This we do by assuming (merely as an expedient short-cut for our purpose) that the number of persons in each single-year age group is approximately equal to one-fifth of the size of the five-year age group in which

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1. United Nations. *The population of South-East Asia (including Ceylon and China: Taiwan),* 1950-1980. Future population estimates by sex and age: Report III (ST/SOA/Series A/No. 30). New York, 1958.
2. A new *Population projection for the Philippines,* 1960-1975, has been prepared by the Philippines Bureau of the Census and Statistics (Demography Division) and published in Manila, 1963. See also: United Nations. *Population projections: Abstracts of recent national projections by age groups for forty-eight areas* (Population Bulletin, Series N, No. 7).
3. See Unesco. *World Survey of Education: II Primary Education,* p. 848.

it is found. Thus we might take two-fifths of the 5-9 age group and consider it as an *approximation* to the pre-school age group, which we have defined as children 5 and 6 years of age. The remaining three-fifths of the 5-9 age group we shall consider to be in the primary school-age population, together with four-fifths of the 10-14 age group, thus obtaining a first approximation to our primary school-age population, which we have defined as made up of the population aged 7-13 years inclusive. For an approximate estimate of the secondary school-age population, which we have defined as including persons 14-17 years of age, we add one-fifth of the 10-14 age group to three-fifths of the 15-19 age group. Table V-10 shows the results of these first approximations to our respective school-age population groups.

From table V-10 we gather that the primary school-age population as defined may be expected to increase from some 6 million in 1965 to almost 10 million in 1980. The secondary school-age population may likewise increase from about 3 million in 1965 to almost 4.5 million in 1980. In addition, some attention will have to be given to the pre-school age group, numbering between 2 and 3 million over the period 1965-1980. In other words, the sheer size of the educational task ahead during this period may be assessed by the total numbers of children and youth involved: about 10.5 million in 1965, increasing to some 12 million in 1970, 15 million in 1975, and over 17 million in 1980.

This may be a good time to pause and consider *the implications of alternative* projections of population based on different assumptions concerning future trends of fertility and mortality. Using the same method of first approximation, but based on three alternative projections of population given in the source referred to in the previous section of this chapter,[1] we obtain approximate estimates of the total pre-school, primary and secondary school-age population as shown in table V-11. Thus we see that the size of the combined school-age population groups, as we have calculated by rough approximation, may vary between 10.5 million and 12.5 million in 1965, and between the extremes of about 14 million and 20 million in 1980, depending on the course of fertility and mortality trends during the coming years.

Our estimates of future school enrolment, based on the "conservative" projection, may therefore be invalidated on the grounds of demographic factors alone, by a margin of error which could amount to 15 or 20 per cent.[2]

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[1] United Nations. *The population of South-East Asia, 1950-1980.*

[2] This is by way of warning to those who might be tempted to place too much confidence in the precision of estimates of school enrolment based on given population projections, which are in turn based on certain assumptions regarding future trends of fertility and mortality.

Table V-10 Philippines: *First approximation estimates of school-age population for 1965, 1970, 1975, 1980*

(Thousands of persons)

Population group	Sex	Approximate size of population group			
		1965	1970	1975	1980
Pre-school age (5 and 6 years)	Male	940	1 110	1 314	1 569
	Female	917	1 083	1 282	1 530
	Both sexes	*1 857*	*2 193*	*2 596*	*3 099*
Primary school age (7-13 years)	Male	2 964	3 513	4 160	4 949
	Female	2 890	3 426	4 058	4 827
	Both sexes	*5 854*	*6 939*	*8 218*	*9 776*
Secondary school age (14-17 years)	Male	1 436	1 607	1 912	2 268
	Female	1 330	1 566	1 864	2 212
	Both sexes	*2 766*	*3 173*	*3 776*	*4 480*
Total: three groups **(5-17 years)**	Male	5 340	6 230	7 386	8 786
	Female	5 137	6 075	7 204	8 569
	Both sexes	*10 477*	*12 305*	*14 590*	*17 355*

Table V-11 Philippines : *First approximation estimates of total school-age population, 1965-1980, according to four alternate population projections*

(Thousands of persons)

Type of projection	Approximate size of total school-age population			
	1965	1970	1975	1980
" Conservative " projection	10 477	12 305	14 590	17 355
" Low mortality " projection	12 454	13 359	16 327	19 906
" Declining fertility "				
(a) Moderate fertility decline	10 477	12 169	13 968	15 827
(b) Rapid fertility decline	10 477	12 032	13 346	14 298

Let us say that, after due consideration we have chosen to base our school enrolment estimates on the " conservative " population projection, fully realizing that our estimates will be subject to error due to faulty assumptions, not only regarding future trends of fertility and mortality, but concerning other factors as well which are not related to the demographic situation.

We are not quite satisfied with the approximate estimates of the school-age population groups shown in table V-10 because of one fallacious assumption. It will be remembered that we had assumed an equal number of persons in each single-year age group within a given five-year age group. Usually this assumption is not correct, since the number of persons in any single-year age group tends to diminish as we go up the age scale. Sometimes it may happen that exceptional conditions of birth and death rates cause a lower age group to be smaller in number than a higher age group.

A more rational method of splitting an estimated five-year age group into single-year age groups is based on a particular method of interpolation devised by certain American demographers, using what are known as the " Sprague multipliers ", named after the person who first devised the formula from which the method was derived.[1] This is not a magic formula which can produce numbers out of thin air, so to speak, but is merely a convenient way of smoothing out irregularities in the age distribution of a population as reported at a census or, as in our case, originally presented in five-year age groups.

Applying this method to the projected population in five-year age groups as given in table V-9, we obtain estimates of population for each of the single-year age groups from 5 to 17 years. Tables V-12, V-13 and V-14 show how this is done for the estimated population of 1965. The results are given in the last column of each table.

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[1] See : United States. Department of Commerce. Bureau of the Census. *Handbook of statistical methods for demographers.* Washington, 1951.

Table V-12 Philippines : *Estimated number of persons 5-9 years of age, by sex and single years of age, 1965, based on projections originally given in five-year age groups.*

Sex and age	Operational item	Age group of population				Sum = interpolated number for each age (thousands)
		0-4	5-9	10-14	15-19	
Male :	*Projected number* (thousands)	*2 938*	*2 349*	*1 943*	*1 745*	
5	multiplier	(+ .0336)	(+ .2272)	(– .0752)	(+ .0144)	
	product	+ 98.7	+ 533.7	– 146.1	+ 25.1	*511*
6	multiplier	(+ .0080)	(+ .2320)	(– .0480)	(+ .0080)	
	product	+ 23.5	+ 545.0	– 93.3	+ 14.0	*489*
7	multiplier	(– .0080)	(+ .2160)	(– .0080)	(+ .0000)	
	product	– 23.5	+ 507.4	– 15.5	–	*468*
8	multiplier	(– .0160)	(+ .1840)	(+ .0400)	(– .0080)	
	product	– 47.0	+ 432.2	+ 77.7	– 14.0	*449*
9	multiplier	(– .0176)	(+ .1408)	(+ .0912)	(– .0144)	
	product	– 51.7	+ 330.7	+ 177.2	– 25.1	*431*
Female :	*Projected number* (thousands)	*2 862*	*2 292*	*1 894*	*1 586*	
5	multiplier	(+ .0336)	(+ .2272)	(– .0752)	(+ .0144)	
	product	+ 96.2	+ 520.7	– 142.4	+ 22.8	497
6	multiplier	(+ .0080)	(+ .2320)	(– .0480)	(+ .0080)	
	product	+ 22.9	+ 531.7	– 90.9	+ 12.7	476
7	multiplier	(– .0080)	(+ .2160)	(– .0080)	(+.0000)	
	product	– 22.9	+ 495.1	– 15.2	+	457
8	multiplier	(– .0160)	(+ .1840)	(+ .0400)	(– .0080)	
	product	– 45.8	+ 421.7	+ 75.8	– 12.7	439
9	multiplier	(– .0176)	(+ .1408)	(+ .0912)	(– .0144)	
	product	– 50.4	+ 322.7	+ 172.7	– 22.8	422

Table V-13 Philippines: *Estimated number of persons 10-14 years of age, by sex and single years of age, 1965, based on projections originally given in five-year age groups*

Sex and age	Operational item	Age group of population					Sum = interpolated number for each age (thousands)
		0-4	5-9	10-14	15-19	20-24	
Male:	*Projected number* (thousands)	*2 938*	*2 349*	*1 943*	*1 745*	*1 371*	
10	multiplier	(– .0128)	(+ .0848)	(+ .1504)	(– .0240)	(+ .0016)	
	product	– 37.6	+ 199.2	+ 292.2	– 41.9	+ 2.2	*414*
11	multiplier	(– .0016)	(+ .0144)	(+ .2224)	(– .0416)	(+ .0064)	
	product	– 4.7	+ 33.8	+ 432.1	– 72.6	+ 8.8	*397*
12	multiplier	(+ .0064)	(– .0336)	(+ .2544)	(– .0336	(+ .0064)	
	product	+ 18.8	– 78.9	+ 494.3	– 58.6	+ 8.8	*384*
13	multiplier	(+ .0064)	(– .0416)	(+ .2224)	(+ .0144)	(– .0016)	
	product	+ 18.8	– 97.7	+ 432.1	+ 25.1	– 2.2	*376*
14	multiplier	(+ .0016)	(– .0240)	(+ .1504)	(+ .0848)	(– .0128)	
	product	+ 4.7	– 56.4	+ 292.2	+ 148.0	– 17.5	*371*
Female:	*Projected number* (thousands)	*2 862*	*2 292*	*1 894*	*1 586*	*1 294*	
10	multiplier	(– .0128)	(+ .0848)	(+ .1504)	(– .0240)	(+ .0016)	
	product	– 36.6	+ 194.4	+ 284.9	– 38.1	+ 2.1	*407*
11	multiplier	(– .0016)	(+ .0144)	(+ .2224	(– .0416)	(+ .0064)	
	product	– 4.6	+ 33.0	+ 421.2	– 66.0	+ 8.3	*392*
12	multiplier	(+ .0064)	(– .0336)	(+ .2544)	(– .0336)	(+ .0064)	
	product	+ 18.3	– 77.0	+ 481.8	– 53.3	+ 8.3	*378*
13	multiplier	(+ .0064)	(– .0416)	(+ .2224)	(+ .0144)	(– .0016)	
	product	+ 18.3	– 95.3	+ 421.2	+ 22.8	– 2.1	*365*
14	multiplier	(+ .0016)	(– .0240)	(+ .1504)	(+ .0848)	(– 0128)	
	product	+ 4.6	– 55.0	+ 284.9	+ 134.5	– 16.6	*352*

Table V-14 Philippines : *Estimated number of persons 15-17 years of age, by sex and single years of age, 1965, based on projections originally given in five-year age groups*

Sex and age	Operational item	Age group of population					Sum = interpolated number for each age (thousands)
		5-9	10-14	15-19	20-24	25-29	
Male :	*Projected number* (thousands)	*2 349*	*1 943*	*1 745*	*1 371*	*1 117*	
15	multiplier	(− .0128)	(+ .0848)	(+ .1504)	(− .0240)	(+ .0016)	
	product	− 30.1	+ 164.8	+ 262.4	− 32.9	+ 1.8	366
16	multiplier	(− .0016)	(+ .0144)	(+.2224)	(− .0416)	(+ .0064)	
	product	− 3.8	+ 28.0	+ 388.1	− 57.0	+ 7.1	362
17	multiplier	(+ .0064)	(− .0336)	(+ .2544)	(− .0336)	(+ .0064)	
	product	+ 15.0	− 65.3	+ 443.9	− 46.1	+ 7.1	355
	Projected number (thousands)	*2 292*	*1 894*	*1 586*	*1 294*	*1 139*	
15	multiplier	(− .0128)	(+ .0848)	(+ .1504)	(− .0240)	(+ .0016)	
	product	− 29.3	+ 160.6	+ 238.5	− 31.1	+ 1.8	*341*
16	multiplier	(− .0016)	(+ .0144)	(+ .2224)	(− .0416)	(+ .0064)	
	product	3.7	+ 27.3	+ 352.7	− 53.8	+ 7.3	*330*
17	multiplier	(+ .0064)	(− .0336)	(+ .2544)	(− .0336)	(+ .0064)	
	product	+ 14.7	− 63.6	+ 403.5	− 43.5	+ 7.3	*318*

By adding together the appropriate numbers from the last columns of tables V-12, V-13 and V-14, we arrive at estimates of our respective school-age population groups, as follows :

Age group	*Population group*	*Sex*	*Number of persons*
5-6	Pre-school-age	Male	1 000 000
		Female	973 000
7-13	Primary school-age	Male	2 919 000
		Female	2 860 000
14-17	Secondary school-age	Male	1 454 000
		Female	1 341 000

We have shown in detail how to apply the "Sprague multipliers" for estimates of single-year population groups from estimates originally given in five-year age goups in order to acquaint the reader with the method. Actually we do not need to go through the full procedure just to obtain our desired results, which is the estimation of specific age groups corresponding to our defined school-age population groups. Table V-15 shows how this can be done by first adding up the separate multipliers for each single year of age within the specified age groups and then applying these aggregate multipliers to the relevant projected numbers. The results thus obtained, shown in the last column of table V-15, are identical to those we have obtained by the extended procedure except for slight discrepancies due to the rounding off of our numbers to the nearest thousand.

Proceeding in the same manner we obtain estimates of these school-age population groups for 1970, 1975, and 1980, using the population estimates reproduced in table V-9. The resulting estimates of school-age population for the period 1965-1980 are summarized in table V-16.

If, for some reason, we needed to make annual estimates of the future school-age population within any of the five-year intervals, we could use the same procedure but would first have to obtain annual estimates of population in five-year age groups from estimates given at five-year intervals, again by interpolation. In the present case, we shall content ourselves with estimates at five-year intervals.[1]

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[1] The interested reader may wish to work out an exercise to obtain estimates of the various school-age population groups for the Philippines, say for each of the years 1965 to 1969, using the basic data given in this chapter.

Table V-15 Philippines: *Estimated school-age population, in three specified age groups, 1965, based on projections originally given in five-year groups*

Sex and age	Operational item	Age group of population						Sum = interpolated number for each age (thousands)
		0-4	5-9	10-14	15-19	20-24	25-29	
Male:	*Projected number* (thousands)	*2 938*	*2 349*	*1 943*	*1 745*	*1 371*	*1 117*	
5-6	multiplier	(+ .0416)	(+ .4592)	(– .1232)	(+ .0224)	.	.	
	product	+ 122.2	+ 1078.7	– 239.4	+ 39.1	.	.	*1 001*
7-13	multiplier	(– .0432)	(+ .5648)	(+ .9728)	(– .1072)	(+ .0128)	.	
	product	– 126.9	+ 1326.7	+ 1890.2	– 187.1	+ 17.5	.	*2 920*
14-17	multiplier	(+ .0016)	(– .0320)	(+ .2160)	(+ .7120)	(– .1120)	(+ .0144)	
	product	+ 4.7	– 75.2	+ 419.7	+ 1242.4	– 153.6	+ 16.1	*1 454*
Female:	*Projected number* (thousands)	*2 862*	*2 292*	*1 894*	*1 586*	*1 294*	*1 139*	
5-6	multiplier	(+ .0416)	(+ .4592)	(– .1232)	(+ .0224)	.	.	
	product	+ 119.1	+ 1052.5	– 233.3	+ 35.5	.	.	974
7-13	multiplier	(– .0432)	(+ .5648)	(+ .9728)	(– .1072)	(+ .0128)	.	
	product	– 123.6	+ 1294.5	+ 1842.5	– 170.0	+ 16.6	.	*2 860*
14-17	multiplier	(+ .0016)	(– .0320)	(+ .2160)	(+ .7120)	(– .1120)	(+ .0144)	
	product	+ 4.6	– 73.3	+ 409.1	+ 1129.2	– 144.9	+ 16.4	*1 341*

Table V-16 Philippines : *Estimated school-age population by specified age groups and by sex, 1965, 1970, 1975, 1980*

(thousands of persons)

Population group	Sex	Estimated number of persons			
		1965	1970	1975	1980
Pre-school-age	Male	1 001	1 176	1 393	1 665
(5 and 6 years)	Female	974	1 149	1 359	1 623
	Both sexes	*1 975*	*2 325*	*2 752*	*3 288*
Primary school-age	Male	2 920	3 482	4 120	4 900
(7-13 years)	Female	2 860	3 396	4 020	4 780
	Both sexes	*5 780*	*6 878*	*8 140*	*9 680*
Secondary school-age	Male	1 454	1 604	1 927	2 282
(14-17 years)	Female	1 341	1 574	1 877	2 225
	Both sexes	*2 795*	*3 178*	*3 804*	*4 507*
Total : three groups	Male	5 375	6 262	7 440	8 847
(5-17 years)	Female	5 175	6 119	7 256	8 628
	Both sexes	*10 550*	*12 381*	*14 696*	*17 475*

Having estimated the future school-age population in three age groups, the next step in our procedure is to estimate what proportion of these population groups may be expected to be attending school during the years 1965-1980. Or rather, we wish to know how many school places should be provided for these age groups of children in the years to come, under certain assumptions concerning the future growth of the school system.

We shall first centre our attention on the primary school-age group, since school attendance in the Philippines is compulsory for every child beginning with the seventh birthday up to the completion of the elementary course, with certain exceptions made in the case of children whose home is too far from the nearest school, or who are being regularly instructed by their parents or guardians, etc.

It would certainly be a desirable goal, to be attained by 1980 if not earlier, to have all the children in the primary school-age group attending school. At present, however, no more than 60-75 per cent of this age group have been attending any school, according to the Censuses of 1948 and 1960 and the Statistical Survey of Households in 1956. The difference between the sexes is rather negligible, with the girls showing a slightly higher attendance ratio than the boys at each of the censuses, but the boys showing a slightly higher ratio from the household survey.

Let us assume that by 1965 the school attendance ratio for both sexes will have reached 80 per cent, and that this ratio will continue to increase steadily by 1 per cent each year, reaching 85 per cent in 1970; and by 1.4 per cent each year thereafter, reaching 92 per cent in 1975 and 99 per cent in 1980. It is perhaps not realistic to aim for a school attendance ratio of 100, even in 1980, since there will likely remain a number of children, who because of mental or physical incapacity would not be able to attend a regular school in any case. On the other hand, by dint of special effort in enforcing compulsory school attendance and by providing enough school teachers and facilities to cope with the increasing school-age population, a school attendance ratio of 99 per cent may well be reached before 1980. For our study, however, let us rest with our assumptions as stated and see what these assumptions would imply in regard to the number of children for whom school places must be provided.

Our estimated number of primary school-age children is expected to increase from 5,780,000 in 1965 to 9,680,000 in 1980. Applying a school attendance ratio rising steadily from 80 per cent in 1965 to 99 per cent in 1980, we obtain the following estimates of the number of children who would be expected to be in school for the years 1965, 1970, 1975 and 1980:

Year	Sex	Number of children (7-13 years)	Assumed attendance ratio %	Number of children expected to be attending school
1965	Male	2 920 000	80	2 336 000
	Female	2 860 000	80	2 288 000
1970	Male	3 482 000	85	2 960 000
	Female	3 396 000	85	2 887 000
1975	Male	4 120 000	92	3 790 000
	Female	4 020 000	92	3 698 000
1980	Male	4 900 000	99	4 851 000
	Female	4 780 000	99	4 732 000

These estimates would imply the provision of approximately 4.6 million school places in 1965 rising to almost 10 million school places in 1980 in order that practically all the children in this age group may be assured of schooling by that time.

However, as we have seen, children at the ages of 5 and 6 years, though not coming under the present compulsory requirement, have in fact been attending school in substantial numbers. According to the Statistical Survey of Households in 1956, about 66,000 boys and about 72,000 girls at these ages were reported to be attending school, constituting some 9 per cent of all boys and over 10 per cent of all girls in this age group. Unless they were to be explicitly exluded from school attendance in the future, we would expect this percentage to increase still further. Let us assume that the school attendance ratio of this age group, both boys and girls, will remain at 10 per cent in 1965, rising to 15 per cent in 1970, 20 per cent in 1975 and 25 per cent in 1980. While some of these children will probably be attending kindergarten, wherever they exist under public or private auspices, the majority of them will most likely show up for enrolment in regular primary schools.

This voluntary school attendance of pre-school-age children is not unusual in many countries and must be taken into consideration when a country is planning for its future development of school education. Furthermore, in the course of the next twenty years, as primary education approaches universality in the Philippines, it is not inconceivable that there may be demand for lowering the age of compulsory schooling, say to 6 years instead of 7. In that event our estimate of 25 per cent school attendance for this age group would have to be raised to something like 50 per cent, if and when compulsory schooling is introduced at the age of 6 years.

Under our assumptions concerning the school attendance ratio of the pre-school-age group, we envisage the number of children in this age group attending school in the coming years as follows:

Year	Sex	Number of children (5-6 years)	Assumed attendance ratio %	Number of children expected to be attending school
1965	Male	1 001 000	10	100 000
	Female	974 000	10	97 000
1970	Male	1 176 000	15	176 000
	Female	1 149 000	15	172 000
1975	Male	1 393 000	20	279 000
	Female	1 359 000	20	272 000
1980	Male	1 665 000	25	416 000
	Female	1 623 000	25	406 000

Now we come to the third of our school-age population groups, those 14-17 years of age. The attendance ratio of this age group was, as we have seen, exceptionally high at the time of the 1948 Census, being 65 per cent for the male population and nearly 59 per cent for the female population. At the 1960 Census these percentages had decreased to 40 per cent male and 34 per cent female. We might assume the male attendance ratio for this age group to rise to 45 per cent in 1965, 55 per cent in 1970, 65 per cent in 1975 and 75 per cent in 1980; and the female attendance ratio from 40 per cent in 1965 to 50 per cent in 1970, 60 per cent in 1975 and 70 per cent in 1980.

It must be remenbered that many of the children in this age group, which we have designated as the secondary school-age group, have actually been attending primary schools, due to delayed starting of school attendance, interruption of primary schooling and other reasons. As conditions improve in this respect, we may expect most or all of this age group to be attending schools at the secondary level.

It appears from the recent school enrolment statistics that, at this level of education, vocational schools at present account for less than 15 per cent of all pupils enrolled, the proportion being less than 30 per cent in public schools and less than 10 per cent in private schools. In the course of further development of secondary education, we might expect more and more pupils after completing their primary education to continue in vocational courses, in order to qualify for occupations which do not require university or professional training.

In the light of these considerations we believe our estimate of the attendance ratio for this age group rising to 75 per cent for boys and 70 per cent for girls over a twenty-year period may not be too optimistic. In any case, these questions concerning educational policy lie beyond the competence of the technician, but the latter must nevertheless anticipate any possible change in trends of school enrolment and take due account of such trends in making his estimates.

On the basis of the assumptions stated above, we arrive at estimates of the number of persons in the age group 14-17 years expected to be attending schools in the years ahead, as follows:

Year	Sex	Number of children (14-17 years)	Assumed attendance ratio %	Number of children expected to be attending school
1965	Male	1 454 000	45	654 000
	Female	1 341 000	40	536 000
1970	Male	1 604 000	55	882 000
	Female	1 574 000	50	787 000
1975	Male	1 927 000	65	1 253 000
	Female	1 877 000	60	1 126 000
1980	Male	2 282 000	75	1 712 000
	Female	2 225 000	70	1 558 000

We shall now summarize our various estimates regarding the number of children and youth expected to be attending school during the period 1965-1980, based on assumed school attendance ratios as stated in the preceding section. This is done in table V-17.

These estimates of persons in the various age groups expected to be attending school may be compared with our estimates of school-age population given in table V-16. We note that the total number of persons expected to be attending school-any school – would increase from about 6 million in 1965 to nearly 8 million in 1970, over 10 million in 1975 and almost 14 million in 1980. The age group most nearly complete in school attendance by 1980 will be the primary school-age group; nearly three-fourths of the secondary school-age group and exactly one-fourth of the pre-school-age group are envisaged to be in school by that time, if these estimates turn out to be close to reality. Of course these proportions are the result of our assumptions regarding the school attendance ratios of the different age-groups.

These figures refer to persons in the different age groups expected to be attending school, without specifying the level of education they will be receiving or the type of school they will be attending. We shall next attempt to estimate the expected enrolment at the first level (primary) and the second level (secondary) of education, and if possible to indicate the possible distribution of pupils, at the first level of education, between urban and rural areas ; and at the second level of education, between public and private schools, and between general and vocational schools.

Table V-18 shows that, in 1950 about 89 per cent of all pupils enrolled in school were found in the primary (including intermediate) schools. By 1955 the proportion of primary school pupils had decreased to 85 per cent, but it had increased again to 86 per cent in 1960. As total school enrolment increases further, we expect this proportion to decrease, since the number of over-aged pupils in primary schools will tend to be reduced and at the same time more and more pupils completing primary education will continue in some form of secondary education. Therefore we shall assume that the percentage of total school enrolment in primary schools will decrease from 85 per cent in 1965 to 82 per cent in 1970 ; to 79 per cent in 1975 and to 76 per cent in 1980. The percentage of total school enrolment in secondary schools will increase correspondingly.

Table V-17 Philippines : *Estimated number of persons attending school, by specified age groups and by sex, 1965, 1970, 1975, 1980*

(Thousands of persons)

Population group	Sex	Estimated number attending school			
		1965	1970	1975	1980
Pre-school-age (5-6 years)	Male	100	176	279	416
	Female	97	172	272	406
	Both sexes	*197*	*348*	*551*	*822*
Primary school-age (7-13 years)	Male	2 336	2 960	3 790	4 851
	Female	2 288	2 887	3 698	4 732
	Both sexes	*4 624*	*5 847*	*7 488*	*9 583*
Secondary school-age (14-17 years)	Male	654	882	1 253	1 712
	Female	536	787	1 126	1 558
	Both sexes	*1 190*	*1 669*	*2 379*	*3 270*
Total : three groups (5-17 years)	Male	3 090	4 018	5 322	6 979
	Female	2 921	3 846	5 096	6 696
	Both sexes	*6 011*	*7 864*	*10 418*	*13 675*

According to the Statistical Survey of Households, the total population of the Philippines in 1957 was distributed about 35 per cent in urban areas and 65 per cent in rural areas. It is said that the definition of " urban " areas used in the Survey is likely to have overstated the proportion of the urban population. On the other hand, we have reason to believe that urban schools enrol a larger share of the country's school-age children than its indicated proportion of the total population. Leaving out of consideration the distribution of school enrolment at the secondary level, and for our purpose concentrating on the primary school enrolment, we might start with an assumption that some 40 per cent of the present enrolment is found in urban primary schools and 60 per cent in rural primary schools.

Table V-18 Philippines: *School enrolment by level of education, observed 1950-1960; estimated 1965-1980*

(Thousands of pupils)

Year	Total school enrolment	First level (primary)		Second level (secondary)	
		Number	Per cent	Number	Per cent
Observed:					
1950	4 567	4 083	89	484	*11*
1951	4 539	3 930	87	609	*13*
1952	4 173	3 583	86	590	*14*
1953	4 124	3 499	85	625	*15*
1954	4 086	3 443	84	643	*16*
1955	4 127	3 499	85	628	*15*
1956	4 293	3 674	86	619	*14*
1957	4 368	3 735	86	633	*14*
1958	4 591	3 970	86	621	*14*
1959	4 788	4 144	87	644	*13*
1960	4 856	4 197	86	659	*14*
Estimated:					
1965	6 011	5 109	85	902	*15*
1970	7 864	6 448	82	1 416	*18*
1975	10 418	8 230	79	2 188	*21*
1980	13 675	10 393	76	3 282	*24*

It has been estimated that with further urbanization of the country, the proportion of the total population living in rural areas may be expected to decrease to about 56 per cent by 1977.[1] In order to assure a more equitable distribution of future enrolment in primary schools between the urban and rural areas, let us assume a gradual increase of the proportion of urban school enrolment from 40 per cent at present to 44 per cent in 1980, with a corresponding decrease of the rural school enrolment from 60 per cent at present to 56 per cent in 1980.

Under these assumptions, and based on the reported primary school enrolment in 1960 and our estimated enrolment in future years, we may expect the respective enrolment in urban and rural primary schools to develop as shown in table V-19.

It is evident from these estimates that much effort will be called for in the development of primary schools in rural areas, for even with a decreasing percentage of rural population, there would still be a substantial increase in total enrolment in rural primary schools, averaging some 100,000 each year in the near future and increasing to an average of some 200,000 each year in the decade of the 1970's.

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[1] See: United Nations. *Population growth and manpower in the Philippines*, Appendix C, "Urban and rural population estimates and projections." For a discussion on the implications of future population growth in regard to educational requirements in the Philippines, see chapter VII, section B, of the same publication.

Table V-19 Philippines : *Estimated distribution of primary school enrolment by urban and rural areas, 1960-1980*

(Thousands of pupils)

Year	Estimated primary school enrolment[1]	Urban primary schools		Rural primary schools	
		Assumed per cent	Number of pupils	Assumed per cent	Number of pupils
1960	4 197	*40*	1 679	*60*	2 518
1965	5 109	*41*	2 095	*59*	3 014
1970	6 448	*42*	2 708	*58*	3 740
1975	8 230	*43*	3 539	*57*	4 691
1980	10 393	*44*	4 573	*56*	5 820

1. Reported enrolment for 1960

Table V-20 Philippines : *Estimated enrolment in all secondary schools, and distribution of enrolment between public and private schools according to three different assumptions, 1965, 1970, 1975, 1980*

(Thousands of pupils)

Year	Estimated enrolment at second level	Assumed distribution[1]	Public schools		Private schools	
			Per cent	Number of pupils	Per cent	Number of pupils
1965	902	(a)	*40*	361	*60*	541
		(b)	*45*	406	*55*	496
		(c)	*50*	451	*50*	451
1970	1 416	(a)	*40*	566	*60*	850
		(b)	*50*	708	*50*	708
		(c)	*60*	850	*40*	566
1975	2 188	(a)	*40*	875	*60*	1 313
		(b)	*55*	1 203	*45*	985
		(c)	*70*	1 532	*30*	656
1980	3 282	(a)	*40*	1 313	*60*	1 969
		(b)	*60*	1 969	*40*	1 313
		(c)	*80*	2 626	*20*	656

1. For explanation of the alternative assumptions, see text.

Private schools have played an important role in the development of education in the Philippines, especially at the secondary and higher levels. When the Department of Instruction was created in 1901 under Act No. 74 of the Philippines Commission, it was provided that "nothing in this Act shall be construed in any way to forbid, impede, or obstruct the establishment and maintenance of private schools".[1] Since in recent years private schools have accounted for less than 5 per cent of the total enrolment in all primary schools, we shall not concern ourselves further with the place of private schools at that level. However, as far as secondary schools are concerned, private school enrolment at present accounts for more than 60 per cent of all pupils at this level. We have not sufficient knowledge of the situation to guide us in estimating the distribution of secondary school enrolment between public and private schools in future years.

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[1] See : Unesco. *World Survey of Education*, II, Primary education, p. 848.

Simply for purposes of illustration we have estimated separately what could be the number of pupils expected to be enrolled in public and private schools at the secondary level during the 1965-1980 period, according to three different assumptions : (a) that the respective percentages of enrolment in public and private schools would remain constant at approximately the present level, that is, 40 per cent public and 60 per cent private ; (b) that the percentage of total enrolment in the public schools would increase slowly from the present level of 40 per cent to something like 60 per cent by 1980 ; (c) that private secondary schools would maintain their numerical strength throughout the period while most if not all the increase in future enrolment would come from the public schools, so that the percentage of all secondary enrolment found in public schools would increase to about 80 per cent by 1980. We are not competent to express any preference for any of these assumptions, but have worked out their implications as shown in table V-20.

According to somewhat incomplete data, the proportion of vocational pupils in the total enrolment of all schools at the second level, for the years 1953 to 1960, has fluctuated between 9 and 17 per cent. For public schools only, this proportion has increased from about 15 per cent in 1950 to almost 25 per cent in 1960. With further development of secondary vocational education, particularly under public auspices, we may expect the over-all proportion of pupils in vocational schools to rise from, say, 20 per cent in 1965 to about 30 per cent in 1980. The latter percentage may be exceeded if there should be a parallel development of vocational education under private auspices, or if the authorities should adopt a policy favouring the accelerated development of secondary vocational schools in order to meet the rising demand for skilled manpower at the sub-professional level.

Under our assumptions as stated above, we expect to find the total number of pupils at the second level enrolled in vocational courses to increase rapidly from about 180,000 in 1965 to nearly 1 million in 1980, as shown in table V.21.

Table V-21. Philippines : *Total enrolment at the second level, and distribution of enrolment between general and vocational secondary schools, observed 1954-1960, estimated 1965-1980*

(Thousands of pupils)

Year	Total enrolment at second level	General secondary schools		Vocational secondary schools	
		Number of pupils	Per cent	Number of pupils	Per cent
Observed :					
1953	625	540	*86*	85	*14*
1954	643	540	*84*	103	*16*
1955	628	522	*83*	106	*17*
1956	619	518	*84*	101	*16*
1957	633	532	*84*	101	*16*
1958[1]	621	564	*91*	57	*9*
1959[1]	644	575	*89*	69	*11*
1960[1]	659	564	*86*	95	*14*
Estimated					
1965	902	722	*80*	180	*20*
1970	1 416	1 104	*78*	312	*22*
1975	2 188	1 641	*75*	547	*25*
1980	3 282	2 297	*70*	985	*30*

[1] Certain types of private vocational schools, with reported enrolment ranging from 35,000 to 56,000 during the years 1953-1957, were not included in the reports for 1958-1960.

4. TESTING THE ENROLMENT ESTIMATES

Having arrived at our estimates of future school enrolment for the period 1965-1980, we shall now test these estimates for their consistency and reasonableness, in the light of historical data we have at our disposal. From table V-7, we find that total primary and intermediate school enrolment (public schools only) had increased from 1,144,000 in 1930 to 4,001,000 in 1960. This implies an average annual rate of increase over the 30-year period of about 4.3 per cent. Part of this increase was due to the growth of the school-age population, but the implied rate of growth of the primary school enrolment was obviously greater than the rate of population growth, which means that there was a net expansion of the primary school system during that period. In order to assess this net expansion of the primary school system over and above the rate of population growth, we shall relate the enrolment figures to a selected age group of the population, thus obtaining a "primary school enrolment ratio" which can serve as a basis of comparison independent of the growth of population. For international comparisons it is customary to use the age group 5-14 years for the computation of a "primary school enrolment ratio".

Based on data published in the *World Survey of Education*, Volume II, and brought up to date, table V-22 shows that the "primary school enrolment ratio" (for public schools only) had increased from 31 for the 1930-1934 period to 56 for the 1955-1959 period. This gives an average annual rate of increase of about 2.4 per cent over the entire period of 25 years (counting from the middle of the 1930-1934 period to the middle of the 1955-1959 period).

We shall now take the total primary school enrolment (public and private schools combined) reported for 1950-1960, and relate it to the population 5-14 years old according to estimates and census enumeration. Thus we find a present enrolment ratio of about 54 having dropped from 63 and 58 in earlier periods (see table V-23). By relating our estimated primary school enrolment for 1965, 1970, 1975 and 1980 to the estimated population in the 5-14 age group for the respective years, we anticipate this ratio to increase successively up to 73 by the year 1980. This would imply an average annual rate of increase of the enrolment ratio amounting to only 1.6 per cent, over the next 20-year period. It is reasonable to expect that the rate of growth of primary school enrolment will tend to level off as we approach the goal of universal primary education. Furthermore, since we are relating

Table V-22 Philippines : *Enrolment in public primary schools in relation to estimated population 5-14 years of age, 1930-1959*

Period	Average annual enrolment in public primary schools (thousands)	Estimated population 5-14 years of age (thousands)	Primary school enrolment ratio (per cent)
1930-1934	1 137	3 680	*31*
1935-1939	1 466	4 139	*35*
1940	1 923	4 411	*44*
1945-1949	3 300	5 372	*61*
1950-1954	3 567	5 907	*60*
1955-1959	3 644	6 519	*56*

Source : Unesco. *World survey of education*, II, Primary education ; enrolment figures for 1955-1959 from Unesco files, and estimated population 5-14 years of age based on population estimates published in the United Nations *Demographic Yearbook*, 1960.

Table V-23 Philippines: *Total enrolment at the first level of education (public and private), in relation to estimated population 5-14 years of age, observed 1950-1960; estimated 1965-1980*

Period or year	Total enrolment at first level of education (thousands)	Estimated population 5-14 years of age (thousands)	Primary school enrolment ratio (per cent)
Observed:			
1950-1954 (average)	3 708	5 907	63
1955-1959 (average)	3 804	6 519	58
1960	4 197	[1] 7 805	54
Estimated:			
1965	5 109	8 478	60
1970	6 448	10 045	64
1975	8 230	11 895	69
1980	10 393	14 157	73

1. Census of 1960.

estimated enrolment in a 6 or 7-year primary school to the estimated population in a 10-year age group, an enrolment ratio of around 70 should be considered satisfactory. Hence we conclude that our estimates of future school enrolment at this level of education are consistent with historical trends and reasonably attainable.

Similarly, we find that the secondary school enrolment ratio, based on enrolment in public schools only, related to the estimated population 15-19 years of age, had increased from about 4.3 in 1930-1934 to about 9.3 in 1955-1959, rising at an average rate of approximately 3.1 per cent per year over a period of 25 years. (See table V-24). Our estimates of the future enrolment at the second level, both public and private, imply a secondary school enrolment ratio to rise from about 23 in 1960 to about 62 in 1980, at an average annual rate of increase of approximately 5.1 per cent. (See table V-25). This would seem to call for very special effort towards the development of secondary education, both general and vocational, over the next two decades. Since we are relating our estimates of enrolment for a four-year secondary school to a five-year age group of population, theoretically the enrolment ratio could reach a maximum around 80 per cent. Thus the anticipated ratio of 62 for 1980 is still well below the theoretical maximum.

Comparing tables V-23 and V-25, it will be noted that the rate of progress envisaged for the development of education at the second level is much higher than the anticipated rate of progress for the development of primary education. This is consistent with the normal tendency for a rate of increase to level off somewhat as it approaches the upper limit, which is the case with the development of primary education in the Philippines, whereas this is not so with the stage of development of secondary education, which is still well below the maximum level.

These comparisons are more clearly shown in graphic form. Chart V-1 shows the trends of primary and secondary school enrolment up to 1960, based on published data for public schools only during the earlier years, and for public and private schools combined between 1950 and 1960. The two broken lines indicate the anticipated development of education at the first and second levels between 1960 and 1980, based on our estimates worked out in this chapter.

We have now completed our task of estimating the future school enrolment for the Philippines, for the period from 1965 to 1980, based on the data we have at hand and the methods explained in this chapter. It must be admitted that better estimates could no doubt be obtained by those in possession of more detailed knowledge of the educational situation in the Philippines. We shall be satisfied if we have only shown by this exercise one of the ways in which this difficult task may be accomplished.

Table V-24 Philippines : *Enrolment in public secondary schools in relation to estimated population 15-19 years of age, 1930-1959*

Period	Average annual enrolment in public secondary schools (thousands)	Estimated population 15-19 years of age (thousands)	Secondary school enrolment ratio (per cent)
1930-1934	61	1 428	4.3
1935-1939	72	1 603	4.5
1940	102	1 712	5.9
1945-1949	176	2 012	8.8
1950-1954	207	2 148	9.6
1955-1959	228	2 446	9.3

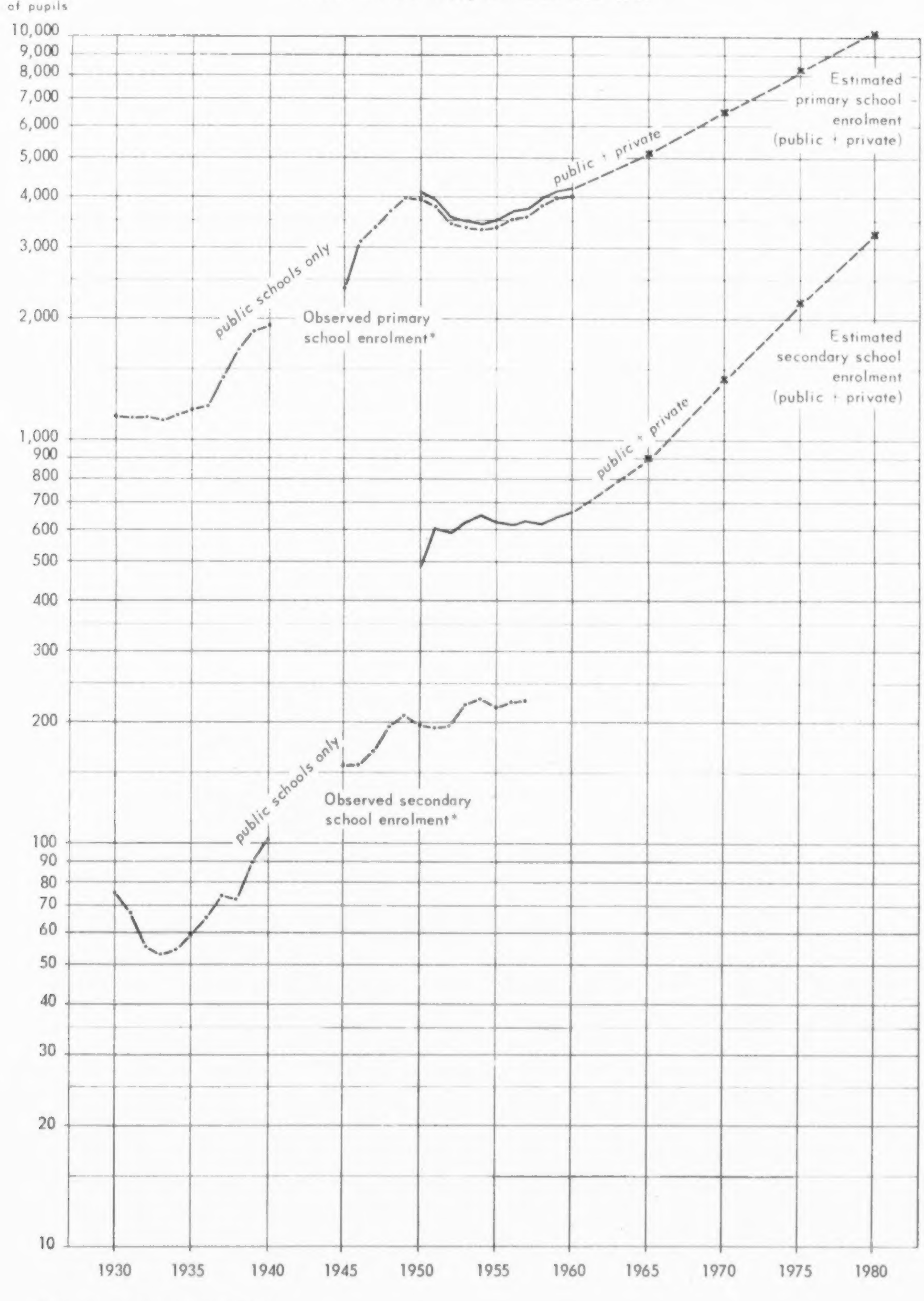
Source : Unesco. *World survey of education*, III, Secondary education ; enrolment figures for 1955-1959 from Unesco files, and estimated population 15-19 years of age based on population estimates published in the United Nations *Demographic Yearbook*, 1960.

Table V-25 Philippines : *Total enrolment at the second level of education (public and private), in relation to estimated population 15-19 years of age, observed 1950-1960 ; estimated 1965-1980.*

Period or year	Total enrolment at second level of education (thousands)	Estimated population 15-19 years of age (thousands)	Secondary school enrolment ratio (per cent)
Observed :			
1950-1954 (average)	**590**	**2 148**	**27**
1955-1959 (average)	**629**	**2 446**	**26**
1960	**659**	**[1]2 814**	**23**
Estimated :			
1965	**902**	**3 331**	**27**
1970	**1 416**	**3 768**	**38**
1975	**2 188**	**4 492**	**49**
1980	**3 282**	**5 331**	**62**

1. Census of 1960.

Chart V - 1. Philippines: Total enrolment in primary and secondary schools, observed 1930 - 1960; estimated 1965 - 1980



*Data not available for 1941 - 1944.

CHAPTER VI

ESTIMATING FUTURE SCHOOL ENROLMENT FOR THE SUDAN, 1962-1971

1. NATURE OF THIS CHAPTER

In continuation of chapters IV and V, the present chapter will present a third case study for purposes of illustrating different methods of estimating future school enrolment in developing countries. This study has to do with the Republic of Sudan, where demographic and educational data, on which estimates of future school enrolment may be based, have become available only in recent years. We have at our disposal four annual volumes of educational statistics compiled by the Ministry of Education of the Republic of Sudan, covering the academic years 1958-1959 to 1961-1962[1]. We also have access to parts of the *Final report* of the First Population Census of Sudan, especially chapter 8 concerning the educational status of the population.[2] In addition, we have consulted the manuscript of a forthcoming publication of the United Nations,[3] from which we have extracted some essential figures on future population estimates relating to population in the age groups 5-19 years old for the period 1956-1971.

To our knowledge, no systematic estimates of future school enrolment in the Sudan have ever been published. Some retrospective data on enrolment in public elementary schools since 1930 and in secondary schools since 1931 may be found in the *World survey of education*[4] published by Unesco, but they are not in a form suitable for use in the present study. We shall now attempt to make some reasonable estimates of school enrolment in the Sudan covering the years 1962-1971.

It must be stated again that the present chapter is not primarily concerned with making the best possible estimates of future school enrolment in the Sudan, but rather with illustrating some procedures which could be useful for making such estimates in situations where basic educational and demographic data are not available in adequate quantity or detail for the application of the usual methods of estimating future school enrolment. Wherever educational and demographic data are available in adequate form, we would advise the use of more refined methods such as are illustrated in chapters IV and V. But there may be situations in developing countries similar to the Sudan, where one may have to make maximum use of whatever data are available, keeping in mind always the possibility of revising one's estimates in the light of later developments and of additional information which becomes available.

2. ANALYSIS OF BASIC DATA

We shall begin our task by making a preliminary analysis of the basic data at hand, in order to fix in mind some of the relevant characteristics and trends of the school system with which we are concerned, in this case the national school system of the Sudan.

The Sudanese sytem of education provides, at the first and second levels of education, three distinct stages of instruction. First comes the elementary school of four years' duration (paralleled by the subgrade, or junior elementary school of three years' duration, leading to the third or fourth grades of the complete elementary school). A competitive examination gives access to the intermediate school (general or vocational), also of four years'duration, leading to an intermediate certificate. Another competitive examination is given for admission to the secondary school (general, vocational or teacher training), again of four years' duration leading to a secondary school certificate. Parallel to the modern forms of second-level education are the traditional religious (Khoranic) schools, open to pupils passing from the elementary schools, with instruction given at both the intermediate and secondary stages. We shall not concern ourselves here with the University, nor with the other forms of post-secondary education, such as the Khartoum Technical Institute or the training centres for intermediate school teachers. There are also a few schools run by Government ministries and departments other than the Ministry of Education, for which comparable enrolment data are not available.

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1. Sudan. Ministry of Education. *Educational statistics*. Annual issues, academic years 1958-1959, 1959-1960, 1960-1961, 1961-1962. Khartoum, 1959-1962.
2. Sudan. Department of Statistics. *First Population Census of Sudan: Final report.*
3. United Nations. Department of Economic and Social Affairs. *Population growth and manpower in the Sudan*: a joint study by the United Nations and the Government of the Sudan (ST/SOA/Series A/Population Studies, to be published).
4. Unesco. *World survey of Education*. Vol. II, Primary education; Vol. III, Secondary education. Paris, 1958-1961.

Table VI-1 gives a summary picture of pupil enrolment in all public and private schools at the first and second levels of education, for the academic year beginning in 1961. Out of a total enrolment of about 410,000 pupils, 73 % were boys and 27% were girls. The percentage of girls enrolled was 29 in the elementary schools, 22 in the general intermediate schools, 16 in the general secondary schools, and nearly 30 in the teacher training centres. The vocational and religious schools, both intermediate and secondary, were attended by boys only.

Table VI-2 gives the distribution of the total enrolment by public (government) and private (non-government) schools. Private schools enrolled only 3 per cent of all the elementary school pupils, but 47 per cent of the general intermediate pupils and 53 per cent of the general secondary pupils. All vocational and teacher training was given in public schools. In the religious schools, 51 per cent of the intermediate pupils and 36 per cent of the secondary pupils were receiving instruction under private auspices. Taken altogether, private schools accounted for just under 11 per cent of all pupil enrolment at the first and second levels of education.

Table VI-3 shows the respective numbers of pupils by urban and rural residence. The rural classification is further divided into two groups: rural-sedentary and rural-nomadic. At the 1955-1956 Census of population, 8 per cent of the population was classified as urban, 78 per cent as rural-sedentary, and 14 per cent as rural-nomadic. In regard to school enrolment, nearly 32 per cent of the elementary pupils, and over half of the intermediate and secondary pupils or 36 per cent of all pupils were classified as of urban. residence. We do not know to what extent children from rural areas may have taken up residence in urban places for the purpose of school education.

A further indication of the uneven distribution of the school population is given by table VI-4, which shows by regions and provinces the number of pupils enrolled in public elementary schools as compared with the population aged from 5 years to puberty, according to the 1955-1956 census. If we take the census figures as rough approximations of the school-age population in 1961, then we find that Khartoum had about 33 per cent of its assumed school-age population enrolled in public elementary schools, as compared with a national average of 14 per cent. At the other extreme are four provinces - Darfur and Kordofan in the North-West; Bahr el Ghazal and Upper Nile in the South - where pupils enrolled in public elementary schools represented less than 10 per cent of the assumed school-age population. In the case of the most under-schooled province - Upper Nile - there were only 5,842 boys and 1,281 girls enrolled in public elementary schools out of a possible school-age population of about 177,000.

Turning to a brighter side of the picture, we note from table VI-5 that total enrolment in public elementary schools, including the junior elementary schools, has more than doubled over a period of only six years between 1955 and 1961. The increase was particularly notable in the case of girls enrolled in junior elementary schools, and was also remarkable in the case of boys in these sub-grade schools. The rate of increase was somewhat less spectacular as regards the complete four-year elementary schools.

Table VI-1 Sudan : *Total enrolment at the first and second levels of education, by level and type of education and sex of pupils, 1961*

Level and type of education	Number of pupils			Per cent female
	Both sexes	Male	Female	
First level				
Elementary	335 089	238 399	96 690	28.9
Second level				
(a) Intermediate stage :				
General	45 991	35 769	10 222	22.2
Vocational	2 016	2 016	-	-
Religious	8 707	8 707	-	-
Total : Intermediate stage	56 714	46 492	10 222	18.0
(b) Secondary stage :				
General	14 644	12 362	2 282	15.6
Vocational	802	802	-	-
Religious	1 345	1 345	-	-
Teacher training	1 272	892	380	29.9
Total : Secondary stage	18 063	15 401	2 662	14.7
Total : First and Second levels	409 866	300 292	109 574	26.7

Source : Unless otherwise noted, the basic data used in this and other tables of this chapter are taken from : Sudan. Ministry of Education. *Educational statistics* (annual volumes for academic years 1958-1959, 1959-1960, 1960-1961, 1961-1962). Khartoum, 1959-1962.

Table VI-2 Sudan : *Enrolment at the first and second levels of education, by public and privates schools, 1961*

Level and type of education	Total Enrolment	Public Schools	Private Schools	Per cent Private
First level				
Elementary	335 089	324 878	10 211	3.0
Second level				
(a) Intermediate stage :				
General	45 991	24 472	21 519	46.8
Vocational	2 016	2 016	-	-
Religious	8 707	4 279	4 428	50.9
(b) Secondary stage :				
General	14 644	6 865	7 779	53.1
Vocational	802	802	-	-
Religious	1 345	858	487	36.2
Teacher training	1 272	1 272	-	-
Total : First and Second levels	409 866	365 442	44 424	10.8

Table VI-3 Sudan : *Enrolment in all public and private schools by level of education, and by residence of pupils, 1961*

Level	Total Enrolment	Pupils by residence			Per cent Rural and Nomadic
		Urban	Rural	Nomadic	
First level					
Elementary	335 089	105 607	221 763	7 719	68.5
Second level					
Intermediate	56 714	30 475	25 409	830	46.3
Secondary	18 063	10 710	7 207	146	40.7
Total : First and second levels	409 866	146 792	254 379	8 695	64.2

Table VI-4 Sudan : *Enrolment in public elementary schools, by sex and by provinces, 1961, compared with population aged 5 years to puberty according to 1955-1956 census.*

(Thousands of pupils and persons)

Region and Province	Pupils in public elementary schools (1961)			Population aged 5 years to puberty (1955-1956) (d)	(c) as per cent of (d)
	Male (a)	Female (b)	Both sexes (c)		
Sudan	*233*	*92*	*325*	*2 372*	*14*
North-East :					
Blue Nile	68	28	97	515	*19*
Kassala	18	8	26	213	*12*
Khartoum	25	18	43	130	33
North-West :					
Darfur	16	4	19	325	6
Kordofan	30	9	38	407	9
Northern	36	15	51	240	*21*
South :					
Bahr el Ghazal	9	2	10	184	6
Equatoria	26	7	33	182	*18*
Upper Nile	6	1	7	177	4

Sources : Enrolment data from Ministry of Education, *Educational Statistics*, 1961-1962 ; population data from *First population census of Sudan*, 1955-1956, *Final report*.

Table VI-5 Sudan : *Enrolment in public schools, at the first level of education, by sex, 1955-1961*

Year	Junior elementary		Elementary		Total : Both sexes
	Male	Female	Male	Female	
1955	53 950	1 156	75 599	30 439	***161 144***
1956	63 872	2 164	103 000	34 150	***203 186***
1957	73 750	12 950	106 237	39 689	***232 626***
1958	83 676	23 784	109 975	41 522	***258 957***
1959	93 888	26 614	116 998	42 935	***280 435***
1960	101 963	33 861	123 077	48 877	***307 778***
1961	107 689	39 220	125 233	52 736	***324 878***

Table VI-6 Sudan: *Enrolment in public intermediate and secondary schools (general), by sex, 1955-1961*

Year	Intermediate		Secondary		Total: Both sexes
	Male	Female	Male	Female	
1955	7 840	1 228	3 220	190	*12 478*
1956	8 800	1 514	3 494	296	*14 104*
1957	15 000	2 183	4 737	343	*22 263*
1958	17 846	3 005	4 947	413	*26 211*
1959	18 794	3 427	5 143	490	*27 854*
1960	19 351	4 024	5 403	586	*29 364*
1961	20 076	4 396	6 034	831	*31 337*

Table VI-7 Sudan: *Enrolment (all male) in public vocational schools at the second level, 1955-1961*

Year	Intermediate vocational	Post-inter vocational	Secondary vocational	Total: all male
1955	680	–	69	*749*
1956	689	75	134	*898*
1957	1 039	150	225	*1 414*
1958	1 390	225	322	*1 937*
1959	1 413	277	351	*2 041*
1960	1 694	331	380	*2 405*
1961	2 016	432	370	*2 818*

Table VI-8 Sudan: *Enrolment (all male) in public religious schools at the second level, 1956-1961*

Year	Intermediate religious	Secondary religious	Total: all male
1956	3 382	690	*4 072*
1957	3 760	760	*4 520*
1958	3 754	800	*4 554*
1959	3 853	840	*4 693*
1960	4 422	840	*5 262*
1961	4 279	858	*5 137*

Table VI-9 Sudan : *Enrolment in public teacher training schools at the second level, by sex, 1958-1961*

Year	Sub-grade teachers training centres		Elementary teachers training centres		Total : Both sexes
	Male	Female	Male	Female	
1958	83	*100	449	177	*809*
1959	173	*120	527	207	*1 027*
1960	192	151	553	176	*1 072*
1961	186	125	706	255	*1 272*

*Estimated

Table VI-10 Sudan : *Enrolment in private elementary, intermediate and secondary schools, by sex, 1958-1961*

Year	Elementary		Intermediate		Secondary		Total : Both sexes[1]
	Male	Female	Male	Female	Male	Female	
1958	6 505		13 505		4 723		*24 733*
1959	4 016	3 944	13 316	4 949	4 980	1 319	*32 524*
1960	5 298	4 604	19 761	5 283	6 464	1 409	*42 819*
1961	5 477	4 734	20 121	5 826	6 815	1 451	*44 424*

1. Total enrolment in all private schools, including kindergarten : (1958) 30,810 ; (1959) 38,762 ; (1960) 44,881 ; (1961) 46,527.

Similarly, at the intermediate and secondary stages of general education, total enrolment in the public schools increased by more than two-and-a-half times during the same period. Again, starting with low figures in 1955, girls' enrolment in general secondary schools multiplied more than four times, and in the intermediate schools nearly four times over six years. The enrolment of boys during the same period had increased more than two-and-a-half times in the intermediate schools and almost doubled in the secondary schools. (See table VI-6).

As regards the public vocational schools, table VI-7 shows a nearly fourfold increase between 1955 and 1961 in the total enrolment, which as we have noted consisted of boys only. In the religious schools, where enrolment is also limited to boys, we note only moderate increase over the most recent years, and in the case of public religious schools at the intermediate level there was apparently a slight decrease registered between 1960 and 1961. (See table VI-8).

Teacher training schools, established only in the last few years, show a small but steady increase in enrolment up to 1961, with the exception of a slight decline between 1960 and 1961 in the number of trainees preparing for teaching in the sub-grade elementary schools. (See table VI-9).

To complete the picture, we note from table VI-10 that there has been parallel development of the private schools, for which we have data only since 1958. The private schools, as we have remarked before, are especially important at the intermediate and secondary levels.

The First Population Census of Sudan, taken during 1955-1956, recorded the ages of the population only in broad age-groups : children under 1 year ; from 1 to under 5 years ; from 5 years to puberty ; and persons past puberty. Only one question was asked relating to the educational characteristics of the population : What was the highest school attended? Results were tabulated in four categories of educational status for children from 5 years to puberty, and in five categories for persons past puberty, as shown in table VI-11.

From this table we note that more than 80 per cent of the children and nearly 90 per cent of the adults had never attended any school up to the time of the Census. About 72 per cent of the boys and 92 per cent of the girls had never attended school. Among the adult persons, 78 per cent of the male population and 97 per cent of the female population had never been to school.

Among the children who had received some schooling, 7 per cent had attended only sub-grade schools; 10 per cent had reached elementary schools; 1.4 per cent had gone as far as intermediate schools. These are averages for both sexes. The percentages for boys were higher, and for girls much lower in each case.

Among the adult persons who had ever attended school, 7.5 per cent had not gone beyond the sub-grade schools; 3.2 per cent had reached the elementary school level; 0.8 per cent had received some schooling in intermediate schools; and only 0.4 per cent claimed to have been in secondary schools and above. Again, the percentages for the male population were higher than these averages, and for the female population much lower.

If this presents a somewhat discouraging picture of the tremendous educational task facing the nation in the years ahead, it must be borne in mind that there is nevertheless a small reservoir of educated manpower, consisting of some 22,000 men and some 4,000 women who had received some secondary schooling or more at the time of the Census. It is among these people, augmented in numbers by recent school and university graduates, that the future school teachers and other educational leaders must be found. It is thus evident that, in order to speed up the development of education at all levels in the near future, the help of "expatriate" teachers from other nations will have to be utilized to the fullest extent possible.

Table VI-11 Sudan: *Population by age group and sex, and by highest school attended, Census of 1955-1956*

Age group and highest school attended	Both sexes		Male		Female	
	Number	Per cent	Number	Per cent	Number	Per cent
Persons 5 years old to puberty	*2 371 779*	*100*	*1 322 484*	*100*	*1 049 295*	*100*
No school	1 919 316	*80.9*	950 093	*71.8*	969 223	*92.4*
Sub-grade	173 360	*7.3*	159 418	*12.1*	13 942	*1.3*
Elementary	246 484	*10.4*	185 112	*14.0*	61 372	*5.8*
Intermediate	32 619	*1.4*	27 861	*2.1*	4 758	*0.5*
Persons over puberty	*5 847 821*	*100*	*2 851 009*	*100*	*2 996 812*	*100*
No school	5 151 285	*88.1*	2 236 279	*78.4*	2 915 006	*97.3*
Sub-grade	436 824	*7.5*	403 549	*14.2*	33 275	*1.1*
Elementary	187 495	*3.2*	150 382	*5.3*	37 113	*1.2*
Intermediate	46 288	*0.8*	39 051	*1.4*	7 237	*0.2*
Secondary and above	25 929	*0.4*	21 748	*0.8*	4 181	*0.1*

Source: Sudan. *First population census of Sudan, 1955-1956: Final report,* Chapter 8.

However, the educational task ahead will involve not only the present generation of children who have not received adequate schooling, but also an ever-increasing number of children who will be reaching school-going ages in the years to come.[1] For this purpose we shall refer to population estimates for the Sudan, covering the years 1956-1971 at five-year intervals, which have been prepared by the United Nations Secretariat.[2]

From these population estimates, by sex and five-year age groups, we have extracted figures relating to three particular age-groups: 5-9, 10-14, and 15-19 years, as being relevant to our purpose. These figures are shown in table VI-12.

Now we shall compare total school enrolment figures reported for 1961 with relevant age-groups of population as estimated for the same year, in order to get an approximate order of magnitude of school enrolment ratios at the respective levels and stages of education. This will provide a base-line or starting point for our estimates of future school enrolment covering the period 1962-1971.

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1. For a country like Sudan, it may be estimated that the children in school-going ages are increasing at a rate between 3 and 3.5 per cent per annum. Such rates are implied in the population estimates for the Sudan mentioned below.
2. United Nations. *Population growth and manpower in the Sudan.*

Level and stage of education	Sex of pupils	Total enrolment (thousands) (a)	Relevant age-group of population	Number of persons (thousands) (b)	(a) as per cent of (b)
First level					
Elementary	Male	238	(5-9 years)	913	*26*
	Female	97		893	*11*
	Both sexes	335		1 806	*19*
Second level:					
Intermediate	Male	47	(10-14 years)	765	*6.1*
	Female	10		746	*1.4*
	Both sexes	57		1 511	3.8
Secondary	Male	15	(15-19 years)	646	*2.4*
	Female	3		629	*0.4*
	Both sexes	18		1 275	*1.4*

3. ESTIMATING FUTURE SCHOOL ENROLMENT

We shall proceed with our task which is to estimate future school enrolment, at the first and second levels of education, for the Sudan as a whole, covering a ten-year period beginning in 1962.

Inasmuch as the number of girl pupils, especially at the intermediate and secondary levels, is exceedingly small and, as will be shown later, the school retention experience of boys and girls is fairly comparable, we shall simplify our computations by dealing with the enrolment of both sexes together. Nor shall we attempt separate estimates for public and private schools, even though we have noted the important place of private schools at the intermediate and secondary levels. For one reason, we presume there must be substantial movement of pupils from public to private schools or vice versa, so that it would be more appropriate to deal with pupil enrolment in all schools together. For another reason, without more direct knowledge of the Government policy regarding the future role of private schools, it would be hazardous for us to attempt any guesses as to whether the private schools, which now cater to nearly half of the pupils at the intermediate and secondary levels, will have a larger, smaller, or constant share of the future enrólment at these levels.

Table VI-12 Sudan: *Estimated population 5-19 years of age, by sex and age groups, 1956-1971*

(Thousands of persons)

Sex and age group	1956	1961	1966	1971
Male:				
5-9	784	913	1 097	1 307
10-14	662	765	893	1 076
15-19	560	646	748	876
Female:				
5-9	766	893	1 070	1 276
10-14	646	746	873	1 049
15-19	545	629	728	855
Both sexes:				
5-9	1 550	1 806	2 167	2 583
10-14	1 308	1 511	1 766	2 125
15-19	1 105	1 275	1 476	1 731

Source: United Nations. *Population growth and manpower in the Sudan*: a joint study by the United Nations and the Government of the Sudan.

At the first level of education, we shall not make separate estimates for the junior elementary (sub-grade) schools and the full-fledged elementary schools. It is our belief that, as soon as qualified teachers and material resources become available, most if not all the sub-grade schools will be transformed into full-fledged elementary schools. In any case, with the existing provision for the pupils in sub-grade schools to transfer, after the third year, to the four-year elementary schools, it would be more appropriate to deal with these types of schools as an integrated system of elementary schools, albeit recognizing the possibility of a certain amount of loss of pupils at the end of the sub-grade schools who are not fortunate enough to be able to continue their elementary education beyond that point.

Since the bulk of the enrolment at the intermediate and secondary levels is found in the schools of general (academic) education, and since we also presume there is the possibility of transfer of pupils from one type of school to another, at the same level or between the intermediate and secondary stages, we shall deal with the second level of education as a whole, separating only the two stages, intermediate and secondary, but not distinguishing the different types of education at the same level. More particularly as regards the religious schools, our lack of knowledge concerning the future prospects of this type of education prevents us from making any plausible assumptions in this respect.

Therefore we shall attempt, on the basis of available data on the present enrolment, and that of the two or three previous years, to make some reasonable estimates of future enrolment at the elementary, intermediate and secondary levels, for each of the years from 1962 to 1971.

It must be obvious to the reader that the principal value of this exercise is in suggesting the use of certain methods and procedures for estimating future school enrolment in similar situations, where many of the necessary elements are lacking in the basic data. The results of our estimation could be radically changed by adopting different sets of assumptions. In order to serve the needs of the educational planner for the Sudan, much more attention will have to be devoted to various essential factors which we shall not be able to take into consideration. For example, the geographical distribution of the schools is one factor which we believe to be of great significance for the future development of education in Sudan. The demand for teachers to cope with the increasing needs of an expanding school system, and the ways in which such demand may be met by the products of an indigenous sytems of teacher training schools would be a suitable subject for a detailed study. Finally, a necessary step in checking the validity of school enrolment estimates would call for a comprehensive study on the cost aspects of educational development, including capital costs of school buildings and equipment, and recurring costs of instruction, administration, maintenance and operation.

Even within the limits of school enrolment estimation, it stands to reason that a truly acceptable job cannot be done on the basis of a handful of published statistics such as we have at our disposal, but must be undertaken only with the help of all sorts of relevant, up-to-date information concerning both the quantitative and qualitative aspects of education, together with direct and detailed knowledge of the underlying objectives and policies of the authorities responsible for the educational and social development of the country.

Finally, we must make it clear that neither the Government of Sudan, nor the international organizations interested in the present project, have been asked to approve or endorse the estimates to be presented in the rest of this chapter. They are meant, we repeat, only for illustration in accordance with the purposes of the *Manual.*

Let us begin with an assumption that the elementary schools of Sudan will, in the course of the next ten years, take in an increasing percentage of the children eligible for beginning school attendance.

It is stated that "no compulsory education prevails in the Sudan since the demand for schooling surpasses the facilities available"[1]. Official publications indicate that children normally begin attending school at the age of seven years, but we presume that children either over or under the age of 7 are nevertheless eligible for admission to elementary school. We do not know precisely how many children are enrolled each year as new pupils entering school for the first time. We do have the number of pupils enrolled in grade 1 of all elementary schools for each of the years 1958-1961, as follows:

(1958-1959)	88 755
(1959-1960)	97 775
(1960-1961)	108 827
(1961-1962)	114 476

From table VI-12 we have the estimated numbers of children 5-9 years of age for the years 1956 and 1961. By interpolation we obtain the following approximate numbers of children aged 5-9 years for each of the years 1958-1961:

(1958)	1 648 000
(1959)	1 699 000
(1960)	1 752 000
(1961)	1 806 000

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[1] Unesco. ***World survey of education, Vol. II, Primary education,*** p. 929.

With these two sets of figures we compute approximate intake ratios for elementary schools, by dividing the number of grade 1 pupils each year by the estimated population 5-9 years of age, as shown below:

Year	Grade 1 pupils	Estimated population 5-9 years old	Approximate intake ratio %
1958	88 755	1 648 000	5.4
1959	97 775	1 699 000	5.8
1960	108 827	1 752 000	6.2
1961	114 476	1 806 000	6.3

Similarly, from table VI-12 and by interpolation, we obtain estimates of the population in the 5-9 years age-group for each of the years 1962-1971, and apply assumed intake ratios increasing from 6.5 per cent in 1962 to 15.0 per cent in 1971, thus arriving at estimated numbers of pupils in grade 1 of elementary school each year, as follows:

Year	Estimated population 5-9 years old	Assumed intake ratio %	Estimated number of pupils in grade 1
1962	1 873 000	6.5	122 000
1963	1 942 000	7.0	136 000
1964	2 014 000	8.0	161 000
1965	2 089 000	9.0	188 000
1966	2 167 000	10.0	217 000
1967	2 244 000	11.0	247 000
1968	2 324 000	12.0	279 000
1969	2 407 000	13.0	313 000
1970	2 493 000	14.0	349 000
1971	2 583 000	15.0	387 000

Note that, except for 1962 and 1963, we have assumed an intake ratio each year of 1 per cent higher than the year before. Of course this is an arbitrary choice, but it is in conformity to one of the recommendations of the Conference of African States on the Development of Education in Africa, held at Addis Ababa, 15-25 May 1961, which envisaged an annual increase of the primary school intake of 5 per cent of the beginning school-age group. Since we are using a five-year age group as our base for computation, an increase of 1 per cent of a five-year age group would be approximately equal to an increase of 5 per cent of a single-year age group, which was the intention of the recommendation.[1]

Now, even under the most favourable conditions we would not expect all the pupils enrolled in grade 1 to be found in grade 2 the following year, in grade 3 the year after, in grade 4 the year after that, or to complete their elementary schooling at the end of their fourth year in school. In other words, we need to know what percentage of the pupils enrolled in each grade are likely to drop out of school, and what percentage will remain in school. Most of those remaining would probably have progressed to the next higher grade the year after, but a number of them would probably be repeating the same grade.

We do not have adequate data on drop-outs and repeaters, but we can work out some approximate ratios concerning the percentage of pupils remaining in elementary school after one, two and three years from available figures on distribution of pupils by grade each year for a few years. Table VI-13 gives such figures for all elementary schools over the period 1958-1961. For 1958, grade distribution of pupils by sex is not available, so we shall start by working with the enrolment figures for both sexes combined.

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[1] See: United Nations Economic Commission for Africa and Unesco. Conference of African States on the Development of Education in Africa, Addis Ababa, 15-25 May 1961. *Final report.* Another recommendation of the Conference called for the achievement of universal, compulsory and free primary education by 1980.

First we note that there were 88,755 pupils of both sexes enrolled in grade E-1 (elementary, grade 1) in the year 1958. Next year, in 1959, we find only 79,680 pupils enrolled in grade E-2. There was apparently a loss of about 9,000 pupils from the cohort which began in grade E-1 in 1958. Possibly many of the pupils in the cohort had not dropped out of school altogether, but simply failed to progress into grade E-2 and were repeating grade E-1 in 1959. On the other hand, possibly not all the pupils in grade E-2 in 1959 had come from the grade E-1 cohort of 1958, because some of these might also have been repeaters from a previous cohort which had been in grade E-2 already in 1958. In the absence of actual data on the number of repeaters by grade each year, we can only assume that the two sets of repeaters were approximately equal in number, hence that the percentage ratio between the grade E-2 enrolment in 1959 and the grade E-1 enrolment in 1958 would represent an *approximate* retention ratio for the grade E-1 cohort of 1958.

On this basis we have computed approximate retention ratios for each of the grade cohorts beginning in 1958, 1959 and 1960, as shown in table VI-14. The last three lines of table VI-14 are average ratios based on three cohorts for both sexes combined and only two of them (1959, 1960) for each sex separately.

From table VI-14 it seems that the retention ratios for girls were slightly better than for boys, judging by the experience of only two annual cohorts. Combining the experience of three annual cohorts of both sexes, we arrive at approximate retention ratios close to 90 per cent between grades E-1 and E-2, and between grades E-2 and E-3, but less than 80 per cent between grades E-3 and E-4. Remembering that many of the pupils finishing the third grade in the sub-grade schools might not have been able to continue in the four-year elementary schools, we find it not surprising that the retention ratio should be lower between the last two grades of elementary school.

Table VI-13. Sudan : *Enrolment in all elementary schools (public and private), by sex and grade, 1958-1961.*

Sex and grade	Number of pupils			
	1958	1959	1960	1961[1]
Male :	...	*214 902*	*230 338*	*238 389*
E-1	...	72 330	77 104	79 801
E-2	...	60 473	63 897	66 043
E-3	...	49 310	53 250	55 032
E-4	...	32 789	36 087	37 513
Female :	...	73 493	*87 342*	96 690
E-1	...	25 445	31 723	34 675
E-2	...	19 207	23 349	26 308
E-3	...	16 490	18 271	20 646
E-4	...	12 351	13 999	15 061
Both sexes :	*265 462*	*288 395*	*317 680*	335 079
E-1	88 755	97 775	108 827	114 476
E-2	75 734	79 680	87 246	92 351
E-3	58 505	65 800	71 521	75 678
E-4	42 468	45 140	50 086	52 574

1. Number of repeaters reported for 1961 are as follows : (E-1) 18,827 ; (E-2) 15,250 ; (E-3) 12,741 ; (E-4) 9,808.

Table VI-14 Sudan: *Approximate grade retention ratios in all elementary schools, by sex and grade, 1958-1961*

Grade cohort		Approximate retention ratio between grades		
Year	Sex	E-1 and E-2	E-2 and E-3	E-3 and E-4
1958	Both sexes	90	87	77
1959	Male	88	88	73
	Female	92	95	85
	Both sexes	89	90	76
1960[1]	Male	86	86	70
	Female	83	88	82
	Both sexes	85	87	74
Average	Male	87	87	72
	Female	88	92	84
	Both sexes	88	88	76

1. Taking into account repeaters (both sexes) as reported for 1961, the grade retention ratios for both sexes would be, respectively 88, 90 and 78.

Since our basic data are not adequate for any more refined methods of calculating grade retention ratios, and since the weight of the boys' enrolment was nearly three times that of the girls' enrolment, we feel justified in ignoring the sex difference and confining ourselves to the average ratios for both sexes as a basis for estimating future enrolment.

We shall, however, assume that the grade retention ratios would improve in the next ten years, so that we could expect roughly 90 per cent of each cohort to remain in school between one year and another, except between the last two years of elementary school, where we shall retain the ratio of 80 per cent for the time being. Eventually, with all or most of the sub-grade schools transformed into full-fledged elementary schools, one might expect the latter ratio also to increase up to 90 per cent.

One other assumption we have to make concerns the percentage of pupils repeating the final year of elementary school, after failing to gain admission to the intermediate schools. With not enough information to guide us on this point, we shall simply make allowance for 10 per cent of grade E-4 pupils to remain in elementary school after their fourth year as repeaters in grade 4.

Having adopted these assumptions concerning grade retention ratios and a repeater ratio for grade 4 pupils, let us apply them to our estimated cohorts beginning in grade E-1 of each year for the next ten years. For example, we have estimated for 1962 a beginning cohort of 122,000 pupils in grade E-1. Applying the 90 per cent assumed retention between grades E-1 and E-2, we would expect 110,000 of these to remain in school in 1963; again, 90 per cent of these – numbering 99,000 – would remain in school in 1964. Since this cohort would be entering its fourth year in 1965, we assume only 80 per cent of the remainder – that is, 79,000 – to continue in school. The following year, 1966, we assume only 10 per cent of these, or 8,000 would be left of the original cohort of pupils who started together in grade 1 in 1962.

Table VI-15 sets out the pattern thus described for each of the future grade E-1 cohorts from 1962 to 1971. However, for the cohorts which began earlier than 1962 we have simply taken the actual grade distribution of pupils enrolled in 1961 as our base. We assume that the 53,000 pupils in grade 4 were from the original cohort of 1958; that the 76,000 in grade 3 all came from the cohort of 1959; and the 92,000 in grade 2 from the cohort of 1960. The 114,000 pupils in grade 1 represent, of course, the entire grade E-1 cohort of 1961. These figures are then diminished successively year by year, according to our assumptions, until they disappear from the school rolls after the fifth year of each cohort's history.

So far we have followed the assumed progress of each successive cohort of grade 1 pupils horizontally across the table. Next we add up vertically the number of pupils assumed to remain from each cohort in a given year, and arrive at a sum which represents our estimate of the total enrolment for that year. The figures for 1961 represent actual enrolment as reported.

Table VI-15 Sudan : *Total enrolment in all elementary schools, actual 1961 and estimated 1962 - 1971*

(Thousands of pupils)

Cohort year	Estimated population 5-9 years of age	Assumed intake ratio %	Estimated number of pupils in E-1 cohort	Estimated number of pupils from each cohort remaining in										
				1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
1958	1 648	5.4	89	53	5	-	-	-	-	-	-	-	-	-
1959	1 699	5.8	98	76	61	6	-	-	-	-	-	-	-	-
1960	1 752	6.2	109	92	83	66	7	-	-	-	-	-	-	-
1961	1 806	6.3	114	114	103	93	74	7	-	-	-	-	-	-
1962	1 873	6.5	122	.	122	110	99	79	8	-	-	-	-	-
1963	1 942	7.0	136	.	.	136	122	110	88	9	-	-	-	-
1964	2 014	8.0	161	.	.	.	161	145	131	105	11	-	-	-
1965	2 089	9.0	188	.	.	.	.	188	169	152	122	12	-	-
1966	2 167	10.0	217	.	.	.	.	.	217	195	176	141	14	-
1967	2 244	11.0	247	.	.	.	.	.	.	247	222	200	160	16
1968	2 324	12.0	279	.	.	.	.	.	.	.	279	251	226	181
1969	2 407	13.0	313	.	.	.	.	.	.	.	.	313	282	254
1970	2 493	14.0	349	.	.	.	.	.	.	.	.	.	349	314
1971	2 583	15.0	387	.	.	.	.	.	.	.	.	.	.	387
Total enrolment in elementary schools [1]				*335*	*374*	*411*	*463*	*529*	*613*	*708*	*810*	*917*	*1 031*	*1 152*

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[1] Actual enrolment for 1961; estimates for 1962-1971.

Thus we have completed the first part of our task, having arrived at provisional estimates of total enrolment in all elementary schools for the next ten years. They are presented here, and compared with actual enrolment for 1961, as follows:

Actual total enrolment in all elementary schools (1961): 335 000

Estimated total enrolment in all elementary schools:

(1962)	374 000	(1967)	708 000
(1963)	411 000	(1968)	810 000
(1964)	463 000	(1969)	917 000
(1965)	529 000	(1970)	1 031 000
(1966)	613 000	(1971)	1 152 000

In order to estimate future enrolment in intermediate schools, we shall first look at the intake ratios of intermediate schools in the last few years. Strictly speaking these ratios should be based on the number of new pupils in grade 1 of intermediate schools as a proportion of the number of pupils who completed grade 4 of elementary schools during the previous year. We have, from table VI-16, a distribution by grade of all pupils enrolled in intermediate schools for each year from 1958 to 1961. Since we have no information concerning repeaters, we have to proceed as if all the grade I-1 pupils were new pupils. And since we cannot tell how many of the pupils enrolled in grade 4 of elementary schools during the previous year actually completed that grade, we again have to assume that they all did. In other words, we shall compare the total enrolment in grade I-1 of each year with the total number of pupils enrolled in grade E-4 of the previous year, and hope that the resulting ratio would not be too far different from the actual intake ratio for intermediate schools.

On this basis, we find that the assumed intake ratio for intermediate schools was about 28 for the beginning cohort of 1959; rising to about 30 for 1960, and over 31 for 1961; as shown below:

Year	Number of pupils in grade 4 of elementary schools (a)	Year	Number of pupils in grade 1 of intermediate schools (b)	(b) as per cent of (a) %
1958	42 468	1959	11 773	27.7
1959	45 140	1960	13 432	29.8
1960	50 086	1961	15 742	31.4

This leads us to conclude that more than two-thirds of the pupils completing their elementary school education each year fail to continue their schooling in intermediate schools. In view of the crying need of the country for more education for its population, it is evident that this enormous wastage resulting from a small intake for intermediate schools is perhaps the weakest link in the chain of educational development for the country.

On the other hand, as we shall see later, the intake ratio for secondary schools, computed on a similar basis, has increased to nearly 60 per cent. It would seem reasonable, and essential for the future development of education, that the intake ratio for intermediate schools be raised as quickly as possible to a level comparable to the intake ratio for secondary schools. Let us take a ratio of 60 per cent as our target to be reached not later than 1971, and assume a gradual annual increase of the ratio over the next ten years. We shall then apply these assumed intake ratios to the estimated grade 4 enrolment in future years. For the sake of simplification, we shall take our estimates of the number of pupils from each grade E-1 cohort expected to remain in school for their fourth and fifth years, and consider those as approximate estimates of future grade E-4 enrolment each year.[1] Thus for 1962 we assume that about 66,000 pupils would be enrolled in grade E-4 (61,000 from the 1959 cohort, and 5,000 from the 1958 cohort). For 1963, we assume that the grade E-4 enrolment would consist of 72,000 pupils (66,000 from the 1960 cohort; 6,000 from the 1959 cohort), and so on.

By applying to these estimated grade E-4 enrolment figures, our assumed intake ratios increasing from 32 per cent in 1962 to 60 per cent in 1971, we arrive at some estimates of the grades I-1 cohort for each of the next ten years, as follows:

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[1] Strictly speaking, this is not entirely correct, for some of the pupils in their fourth year of study would be repeaters in grade 3; but we are dealing with approximate estimates here and we do not have adequate information on repeaters to guide us in making more refined estimates.

Year	Estimated number of pupils in grade 4 of elementary schools	Assumed intake ratio of intermediate schools %	Year	Estimated number of pupils in grade 1 of intermediate schools
1961	53 000	32	1962	17 000
1962	66 000	34	1963	22 400
1963	72 000	36	1964	25 900
1964	81 000	39	1965	31 600
1965	86 000	42	1966	36 100
1966	96 000	45	1967	43 200
1967	114 000	48	1968	54 700
1968	133 000	52	1969	69 200
1969	153 000	56	1970	85 700
1970	174 000	60	1971	104 400

Having prepared our estimates of the annual cohorts of pupils beginning in grade 1 of intermediate schools, we shall need some estimates concerning retention ratios in intermediate schools, similar to those we applied in estimating future enrolment in elementary schools.

Here we encounter a new source of difficulty. Looking at the figures on grade distribution of pupils in intermediate schools, as given in table VI-16, we find that, in the case of boys, the number of pupils reported to be enrolled in each of the higher grades for a given year, is always higher than the total number of pupils enrolled one grade lower the previous year. For example, we find there were 9,071 boys in grade I-1 (grade 1, intermediate) for 1959. The next year, 1960, there were 9,983 boys enrolled in grade I-2. We can only explain this by supposing that the pupils enrolled in grade I-2 for 1960 included not only a large number of repeaters but also many pupils who had dropped out of school after completing grade I-1 in previous years.

The same phenomenon does not appear in the case of girls, except for one comparison, between the pupils in grade I-3 for 1960 and grade I-4 for 1961. Possibly there were not as many girls repeating the higher grades or returning to school after dropping out prematurely.

Table VI-16 Sudan : *Enrolment in all intermediate schools (public and private), by sex and grade, 1958-1961.*

Sex and grade	Number of pupils			
	1958	1959	1960	1961
Male :	...	*32 110*	*38 137*	*46 500*
I-1	...	9 071	10 664	12 738
I-2	...	8 488	9 983	12 313
I-3	...	7 263	9 063	10 858
I-4	...	7 288	8 427	10 591
Female :	...	*8 376*	*9 226*	*10 222*
I-1	...	2 702	2 768	3 004
I-2	...	2 515	2 426	2 713
I-3	...	1 856	2 220	2 238
I-4	...	1 303	1 812	2 267
Both sexes :	*34 356*	*40 486*	*47 363*	*56 722*
I-1	9 787	11 773	13 432	15 742
I-2	8 919	11 003	12 409	15 026
I-3	8 146	9 119	11 283	13 096
I-4	7 504	8 591	10 239	12 858

Apart from the possibility of increasing numbers of pupils repeating grades or resuming their studies after dropping out of school for one or more years, we must also face the alternative explanation that the apparent increase in grade enrolment shown by the official statistics may be due, at least in part, to more complete reporting on the part of the schools. Obviously under such conditions we cannot attempt to calculate grade retention ratios from existing data, nor use such ratios (in most cases exceeding 100 per cent) as a basis for estimating future school enrolment.

We have no information on repeaters. In the absence of more complete information, we shall assume that eventually a situation where the number of repeaters continually increases as the pupils proceed to higher grades (if our supposition proves to be correct) must be changed. So we shall assume that the grade retention ratio for intermediate schools will approximate 90 per cent between each grade and the next in every instance. We shall again make allowance for 10 per cent of the grade 4 pupils to remain in school one more year, as we did for the elementary schools.

Under these assumptions, and proceeding exactly as before, we arrive at our estimates for the total enrolment in intermediate schools for the next ten years as shown in table VI-17.

We present below our provisional estimates of total enrolment in intermediate schools for each year from 1962 to 1971, as compared with the actual enrolment reported for 1961:

Actual enrolment in all intermediate schools (1961): 56 700

Estimated enrolment in all intermediate schools:

(1962)	57 700	(1967)	121 800
(1963)	63 800	(1968)	147 800
(1964)	72 500	(1969)	182 100
(1965)	86 600	(1970)	226 400
(1966)	103 100	(1971)	280 700

Table VI-17 Sudan : *Total enrolment in all intermediate schools, actual 1961 and estimated 1962-1971.*

(Thousands of pupils)

Cohort year	Estimated no. of pupils in grade E-4 of previous yr.	Assumed intake ratio %	Estimated number of pupils in I-1 cohort	Estimated number of pupils remaining from each cohort in										
				1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
1958	...	...	...	12.9	1.3	-	-	-	-	-	-	-	-	-
1959	...	...	...	13.1	11.8	1.2	-	-	-	-	-	-	-	-
1960	...	...	...	15.0	13.5	12.2	1.2	-	-	-	-	-	-	-
1961	50	31	15.7	15.7	14.1	12.7	11.4	1.1	-	-	-	-	-	-
1962	53	32	17.0	.	17.0	15.3	13.8	12.4	1.2	-	-	-	-	-
1963	66	34	22.4	.	.	22.4	20.2	18.2	16.4	1.6	-	-	-	-
1964	72	36	25.9	.	.	.	25.9	23.3	21.0	18.9	1.9	-	-	-
1965	81	39	31.6	.	.	.	.	31.6	28.4	25.6	23.0	2.3	-	-
1966	86	42	36.1	.	.	.	.	.	36.1	32.5	29.3	26.4	2.6	-
1967	96	45	43.2	.	.	.	.	.	.	43.2	38.9	35.0	31.5	3.2
1968	114	48	54.7	.	.	.	.	.	.	.	54.7	49.2	44.3	39.9
1969	133	52	69.2	.	.	.	.	.	.	.	.	69.2	62.3	56.1
1970	153	56	85.7	.	.	.	.	.	.	.	.	.	85.7	77.1
1971	174	60	104.4	.	.	.	.	.	.	.	.	.	.	104.4
Total enrolment in intermediate schools[1]				*56.7*	*57.7*	*63.8*	*72.5*	*86.6*	*103.1*	*121.8*	*147.8*	*182.1*	*226.4*	*280.7*

1. Actual enrolment for 1961; estimates for 1962-1971.

Before we proceed to make our estimates of future enrolment in secondary schools, we look at the reported enrolment figures, distributed by sex and grade, for the years 1958-1961, as given in table VI-18.

Comparing the reported enrolment in grade S-1 (grade 1, secondary) for each year with the reported enrolment in grade I-4 (grade 4, intermediate) of the previous year, we obtain the following approximate intake ratios for secondary schools:

Year	Number of pupils in grade 4 of intermediate schools (a)	Year	Number of pupils in grade 1 of secondary schools (b)	(b) as per cent of (a)
1958	7 504	1959	3 673	48.9
1959	8 591	1960	3 295	38.4
1960	10 239	1961	5 702	55.7

We have difficulty in reconciling the sudden drop in the secondary school intake ratio between the years 1959 and 1960, due apparently to the small number of pupils reported for grade 1 in all secondary schools for 1960. Even though these intake ratios are much higher than those found for the intermediate schools, we believe there is still possibility of increasing them, say up to 65 per cent in 1971. Hence we estimate the number of pupils in future grade S-1 cohorts, based on our estimated number of pupils in grade I-4 and our assumption of increasing intake ratios, as follows:

Table VI-18 Sudan: *Enrolment in all secondary schools (public and private), by sex and grade, 1958-1961*

Sex and grade	Number of pupils			
	1958	1959	1960	1961
Male:	...	*10 093*	*11 364*	*15 401*
S-1	...	3 056	2 682	4 721
S-2	...	2 830	3 214	3 595
S-3	...	2 532	2 877	3 641
S-4	...	1 675	2 591	3 444
Female:	...	*1 809*	*1 995*	*2 662*
S-1	...	617	613	981
S-2	...	444	583	719
S-3	...	365	415	498
S-4	...	383	384	464
Both sexes:	*10 113*	*11 902*	*13 359*	*18 063*
S-1	3 191	3 673	3 295	5 702
S-2	2 818	3 274	3 797	4 314
S-3	2 517	2 897	3 292	4 139
S-4	1 587	2 058	2 975	3 908

Year	Estimated number of pupils in grade 4 of intermediate schools	Assumed intake ratio of secondary schools %	Year	Estimated number of pupils in grade 1 of secondary schools
1961	13 000	57	1962	7 400
1962	13 000	58	1963	7 500
1963	13 000	59	1964	7 700
1964	13 000	60	1965	7 800
1965	14 000	61	1966	8 500
1966	18 000	61	1967	11 000
1967	21 000	62	1968	13 000
1968	25 000	63	1969	15 800
1969	29 000	64	1970	18 600
1970	34 000	65	1971	22 100

Proceeding in the same manner as we did with the intermediate schools, involving the same assumptions, we arrive at provisional estimates of future enrolment in all secondary schools for the years 1962-1971, as shown in table VI-19.

Table VI-19 Sudan : *Total enrolment in all secondary schools, actual 1961 and estimated 1962-1971*

(Thousands of pupils)

Cohort year	Estimated no. of pupils in grade I-4 of previous yr.	Assumed intake ratio %	Estimated no. of pupils in S-1 cohort	Estimated number of pupils from each cohort remaining in										
				1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
1958	.	.	.	3.9	0.4	–	–	–	–	–	–	–	–	–
1959	.	.	.	4.1	3.7	0.4	–	–	–	–	–	–	–	–
1960	.	.	.	4.3	3.9	3.5	0.4	–	–	–	–	–	–	–
1961	10	57	5.7	5.7	5.1	4.6	4.1	0.4	–	–	–	–	–	–
1962	13	57	7.4	.	7.4	6.7	6.0	5.4	0.5	–	–	–	–	–
1963	13	58	7.5	.	.	7.5	6.8	6.1	5.5	0.6	–	–	–	–
1964	13	59	7.7	.	.	.	7.7	6.9	6.2	5.6	0.6	–	–	–
1965	13	60	7.8	.	.	.	.	7.8	7.0	6.3	5.7	0.6	–	–
1966	14	61	8.5	.	.	.	.	.	8.5	7.6	6.8	6.1	0.6	–
1967	18	61	11.0	.	.	.	.	.	.	11.0	9.9	8.9	8.0	0.8
1968	21	62	13.0	.	.	.	.	.	.	.	13.0	11.7	10.5	9.5
1969	25	63	15.8	.	.	.	.	.	.	.	.	15.8	14.2	12.8
1970	29	64	18.6	.	.	.	.	.	.	.	.	.	18.6	16.7
1971	34	65	22.1	.	.	.	.	.	.	.	.	.	.	22.1
Total enrolment in secondary schools[1]				*18.0*	*20.5*	*22.7*	*25.0*	*26.6*	*27.7*	*31.1*	*36.0*	*43.1*	*51.9*	*61.9*

[1] Actual enrolment for 1961 ; estimates for 1962 - 1971.

These estimates are presented on the previous page. The actual enrolment reported for 1961 is:

Actual enrolment in all secondary schools (1961): 18 000

Estimated enrolment in all secondary schools:

(1962)	20 500	(1967)	31 100
(1963)	22 700	(1968)	36 000
(1964)	25 000	(1969)	43 100
(1965)	26 600	(1970)	51 900
(1966)	27 700	(1971)	61 900

At this point we shall review our provision estimates of future enrolment in elementary, intermediate and secondary schools for the period 1962-1971, and test them for consistency and reasonableness, in the light of various related factors as we know them.

4. TESTING THE ENROLMENT ESTIMATES

Now that we have arrived at provisional estimates of school enrolment at the elementary, intermediate and secondary levels for the period 1962-1971, let us see if they are consistent and reasonable. This kind of review, in the light of our knowledge of the present situation and past trends, concerning school enrolment as well as other related factors, may lead us to modify or revise our estimates where they appear to be too high or too low, unrealistic or infeasible. In any case, if the results of this illustrative exercise were to be used for purposes of educational planning, such a review would be absolutely necessary before the authorities could be persuaded to commit the human and material resources of the country in order to achieve the desired goals of educational development.

First, let us look at the estimated enrolment for elementary schools during the next ten years, and the implication of these estimates both as to the rate of growth of elementary school enrolment and as to the ultimate objective of achieving universal education at this level.

We note, from table VI-20, that between 1958 and 1961, over a period of three years, total enrolment in all elementary schools had increased from 265,000 to 335,000, at an average rate of approximately 8 per cent per year. Our estimates would imply an average growth rate of 13 per cent per year over the next ten years, as shown in the next column.

	Estimated growth in enrolment	Implied rate of growth %
(1961-1962)	39 000	16
(1962-1963)	37 000	10
(1963-1964)	52 000	13
(1964-1965)	66 000	14
(1965-1966)	84 000	16
(1966-1967)	95 000	15
(1967-1968)	102 000	14
(1968-1969)	107 000	13
(1969-1970)	114 000	12
(1970-1971)	121 000	12

Since the annual growth rate of the school-age population may be between 3 and 3.5 per cent per year, we should consider an annual growth rate of 13 per cent in elementary school enrolment as both satisfactory and not unreasonable. It may be noted in passing that, as total enrolment continues to increase, the annual increase in number of pupils will be larger each year than the year before, though the *rate* of increase will be smaller.

If we look at the last column of table VI-20, we see that the ratio of elementary school enrolment to the estimated population 5-9 years of age had increased approximately 1 per cent each year between 1958 and 1961. Our estimated enrolment for the next ten years would imply a steady and accelerated increase of this ratio up to 45 per cent in 1971. Since we are using a five-year age group of the population as base, and the duration of the full elementary school is only four years, we would not normally expect this ratio to rise above 80 per cent approximately. While our estimated ratio of 45 per cent in 1971 would still be far below the theoretical maximum, it would nevertheless represent substantial progress from the present ratio of less than 20 per cent in 1961. This would tend to confirm our conclusion that our estimates of elementary school enrolment for the next ten years are reasonably satisfactory. If it were felt that there should be even more rapid progress, then our estimates could be raised by revising our assumptions regarding the elementary school intake ratios and grade retention ratios as detailed in the previous section. It should be kept in mind, however, that any increase in the estimates for the elementary school enrolment would mean corresponding increases in the estimates for the intermediate and secondary schools, unless our assumed intake and retention ratios for the latter should be reduced at the same time.

We shall next look at our estimates of enrolment for the intermediate schools, and compare them with the estimated population 10-14 years of age, as shown in table VI-21. These population estimates year by year are obtained by interpolation, as in the case of the population 5-9 years of age, from the population estimates given in table VI-12 at five-year intervals.

Table VI-20 Sudan : *Elementary school enrolment, 1958-1971, compared with estimated population 5-9 years of age.*

(Thousands of pupils and persons)

Year	Total enrolment in elementary schools	Estimated population 5-9 years of age	Elementary enrolment ratio %
Observed:			
1958	265	1 648	*16*
1959	288	1 699	*17*
1960	318	1 752	*18*
1961	335	1 806	*19*
Estimated:			
1962	374	1 873	*20*
1963	411	1 942	*21*
1964	463	2 014	*23*
1965	529	2 089	*25*
1966	613	2 167	*28*
1967	708	2 244	*32*
1968	810	2 324	*35*
1969	917	2 407	*38*
1970	1 031	2 493	*41*
1971	1 152	2 583	*45*

We find that the total enrolment in all intermediate schools had increased from 34,400 to 56,700 between 1958 and 1961, at an average rate of 18 per cent increase each year. Our estimated enrolment for the next ten years, increasing from 56,700 to 280,700, implies an average annual rate of increase of slightly over 17 per cent, with a smaller average rate (about 13 per cent) during the first five-year period, and a larger average rate (about 22 per cent) during the second five-year period. Note that the increase of intermediate school pupils is derived in part from the increase of pupils in the last year of elementary school and in part from an assumed increase in the intake ratio for intermediate schools. Therefore an average rate of 13 per cent increase in intermediate enrolment, parallel to the average growth rate of elementary school enrolment, would seem reasonable as long as the intake ratio for intermediate schools remains at a relatively low level. The more rapid growth of intermediate school enrolment to be expected after 1966 is mainly the consequence of our assumption of an intake ratio rapidly increasing up to 60 per cent (see table VI-17).

The last column of table VI-21 shows the increase in the intermediate enrolment ratio, based on estimated population 10-14 years of age. Starting at 2.6 per cent in 1958, this ratio had increased to 3.8 per cent by 1961, and we assume it will continue to increase up to about 13 per cent in 1971. If this seems like a very steep increase over a ten-year period, we must remember that the elementary enrolment ratio, relating to the estimated population in the age-group 5-9 years, had already reached nearly 20 per cent in 1961, and is expected to reach about 45 per cent by 1971. Unless it should be the policy to limit the benefits of an intermediate education to a very small minority of the population, we would consider an enrolment ratio of even 13 per cent as too small. Perhaps we should raise our sights higher by further increasing the intake ratio for intermediate schools, say up to 80 per cent instead of 60 per cent by 1971. But this kind of policy decision can only be made by the proper authorities, and is not normally within the province of the technician.

Table VI-21 Sudan : *Intermediate school enrolment, 1958-1972, compared with estimated population 10-14 years of age*

(Thousands of pupils and persons)

Year	Total enrolment in all intermediate schools	Estimated population 10-14 years of age	Intermediate enrolment ratio %
Observed:			
1958	34.4	1 346	2.6
1959	40.5	1 385	2.9
1960	47.4	1 468	3.2
1961	56.7	1 511	3.8
Estimated:			
1962	57.7	1 559	3.7
1963	63.8	1 608	4.0
1964	72.5	1 659	4.4
1965	86.6	1 712	5.1
1966	103.1	1 766	5.8
1967	121.8	1 833	6.6
1968	147.8	1 902	7.8
1969	182.1	1 974	9.2
1970	226.4	2 048	11.1
1971	280.7	2 125	13.2

Lastly, we come to our estimates of secondary school enrolment, set out in table VI-22, together with actual enrolment data for previous years, and estimates of the population 15-19 years of age (obtained by interpolation from table VI-12). Here we find a remarkably high rate of increase in secondary school enrolment registered between 1958 and 1961 (especially between 1960 and 1961), averaging 21 per cent annually. The growth rate implied in our estimated enrolment for the next ten years amounts to only 13 per cent per annum (average of 9 per cent between 1961 and 1966; average of 17 per cent between 1966 and 1971). If the 1958-1961 data are a reliable guide, we have probably under-estimated the growth potential of secondary school enrolment, particularly in the first five-year period. We may find a clue to the exceptional growth of secondary school enrolment between 1958 and 1961 in the fact that when new schools are opened at this level, they tend to draw pupils not only from the current output of the intermediate schools but also from those who had previously gone through intermediate schools but, for one reason or another, did not have the opportunity to enter a secondary school. If this should be a correct supposition, then we would have to revise our estimates of the future intake of secondary schools, by adding, so to speak, a backlog of eligible candidates from previous cohorts of intermediate school pupils to our assumed percentage of current graduates from intermediate schools. Without more detailed knowledge of the actual situation, however, it would be difficult for us to make such an adjustment to our estimates.

Table VI-22 Sudan : *Secondary school enrolment, 1958-1971, compared with estimated population 15-19 years old*

(Thousands of pupils and persons)

Year	Total enrolment in all secondary schools	Estimated population 15-19 years of age	Secondary enrolment ratio %
Observed :			
1958	10.1	1 170	0.9
1959	11.9	1 204	1.0
1960	13.4	1 239	1.1
1961	18.1	1 275	1.4
Estimated :			
1962	20.5	1 313	1.6
1963	22.7	1 352	1.7
1964	25.0	1 392	1.8
1965	26.6	1 433	1.9
1966	27.7	1 476	1.9
1967	31.1	1 524	2.0
1968	36.0	1 573	2.3
1969	43.1	1 624	2.7
1970	51.9	1 677	3.1
1971	61.9	1 731	3.6

The above supposition is further supported by the secondary enrolment ratios calculated on the basis of our estimates and set out in the last column of table VI-22. It is quite possible that the enrolment ratio at this level of education should be considerably higher, especially for the years between 1962 and 1969. For the sake of exercise, let us assume that the expected enrolment ratio would rise more rapidly at first, because of the "backlog" of eligible candidates for secondary education mentioned above. After a few years, the situation would become more normal, when the secondary school enrolment would grow in proportion to the growth of intermediate enrolment. On some such assumptions we might revise our estimates of secondary enrolment as follows :

Year	Estimated population 15-19 years of age (thousands)	Assumed enrolment ratio %	Estimated secondary enrolment
1962	1 313	1.7	22 300
1963	1 352	2.0	27 000
1964	1 392	2.3	32 000
1965	1 433	2.5	35 800
1966	1 476	2.6	38 400
1967	1 524	2.8	42 700
1968	1 573	3.0	47 200
1969	1 624	3.2	52 000
1970	1 677	3.4	57 000
1971	1 731	3.6	62 300

We shall leave it to the reader's ingenuity to devise still other means of adjusting our original estimates to make allowance for special situations such as we have surmised above. Meanwhile, let us proceed with one more step in the testing of our enrolment estimates.

We shall now examine the implications of our enrolment estimates in terms of the number of teachers who will be required to take care of the increasing number of pupils at each level of education.

We return to our sources for data on the number of teachers in service during the school year 1961. When these numbers are divided by the number of pupils enrolled at each level, and for each type of education, we obtain a set of average pupil-teacher ratios, as shown in table VI-23.

We note that the highest pupil-teacher ratios were found, as expected, at the first level of education. In the public junior elementary schools, there were 3,961 teachers for a total enrolment of 146,909 pupils, making an average ratio of 37 pupils per teacher, which seems to be a reasonable ratio. In the complete elementary schools, however, the average ratio was 44 pupils per teacher. This appears rather high as an average ratio, for there must have been many individual schools where the ratio would be higher than this average, as well as those schools (perhaps in areas more sparsely populated) where the actual ratio would be lower than the average. At the intermediate level, the average pupil-teacher ratios seem rather low on the whole, ranging from 21 in general intermediate schools to 13 in vocational schools. Also, at the secondary level, the ratio of pupils per teacher was even below 10 in the teacher training schools, and was no higher than 23 in the religious schools. For private schools, at all levels, the average ratio was 23 pupils per teacher.

If we were to assume that the average pupil-teacher ratio for all elementary schools (including junior elementary schools) could be reduced to about 35, while the ratio for all intermediate schools could be *raised* to about the same level, and that the secondary school pupil-teacher ratio could also be raised to something like 28, then the estimated number of teachers required for each level of education would be approximately as shown in table VI-24. Compared with the present number of teachers, this would imply an addition to the elementary teaching staff amounting to about 1,000 teachers a year at first, increasing to over 4,000 teachers between 1970 and 1971. In addition, allowance must be made for additional teachers to replace those leaving the service for one reason or another: death, retirement, change of occupation, etc.

The total enrolment in the existing teacher training schools for elementary teachers being slightly more than 1,000, it is obvious that not enough trained teachers will be available to meet the needs for new teachers in the next few years. Without going into the complicated questions of teacher recruitment, we can only assume that those teaching posts will be filled somehow by persons who have already received an adequate general education without the benefit of special training. As time goes on, more teacher training schools will surely have to be opened, drawing candidates from among those pupils in intermediate and secondary schools who may not wish to continue with their general education.

The requirement for additional teachers at the intermediate and secondary levels, though less in number, is perhaps more crucial, since there seem to be no more than, 250 persons at present receiving training in three teacher training schools for this purpose, one of them established only in 1961. About one-third of the present teachers in intermediate and secondary schools under government auspices, and possibly all, or a great majority of the teachers in non-government schools under the auspices of missionary societies or foreign communities, are Non-Sudanese, commonly known as "expatriates". According to our estimates of future enrolment in intermediate and secondary level schools, a teaching force of at least 10,000 will be needed by 1971. To what extent this requirement can be met by indigenous teachers trained in the nation's own schools or through study abroad, and to what extent the use of "expatriate" teachers will be increased in the near future – these are questions whose answers could very well determine the feasibility of the kind of educational expansion envisaged in the present exercise on estimating future school enrolment for the Sudan during the coming decade.

Table VI-23 Sudan: *Number of pupils and teachers, by level and type of education, and average pupil-teacher ratios, 1961*

Level and type of education	Number of pupils	Number of teachers	Average number of pupils per teacher
Public:			
Junior elementary	146 909	3 961	37
Elementary	177 969	4 002	44
Intermediate –			
General	24 472	1 162	21
Vocational	2 016	160	13
Religious	4 279	216	20
Secondary –			
General	6 865	448	15
Vocational	802	64	13
Religious	858	37	23
Teacher Training	1 272	132	10
Private:			
All levels	46 527	2 044	23

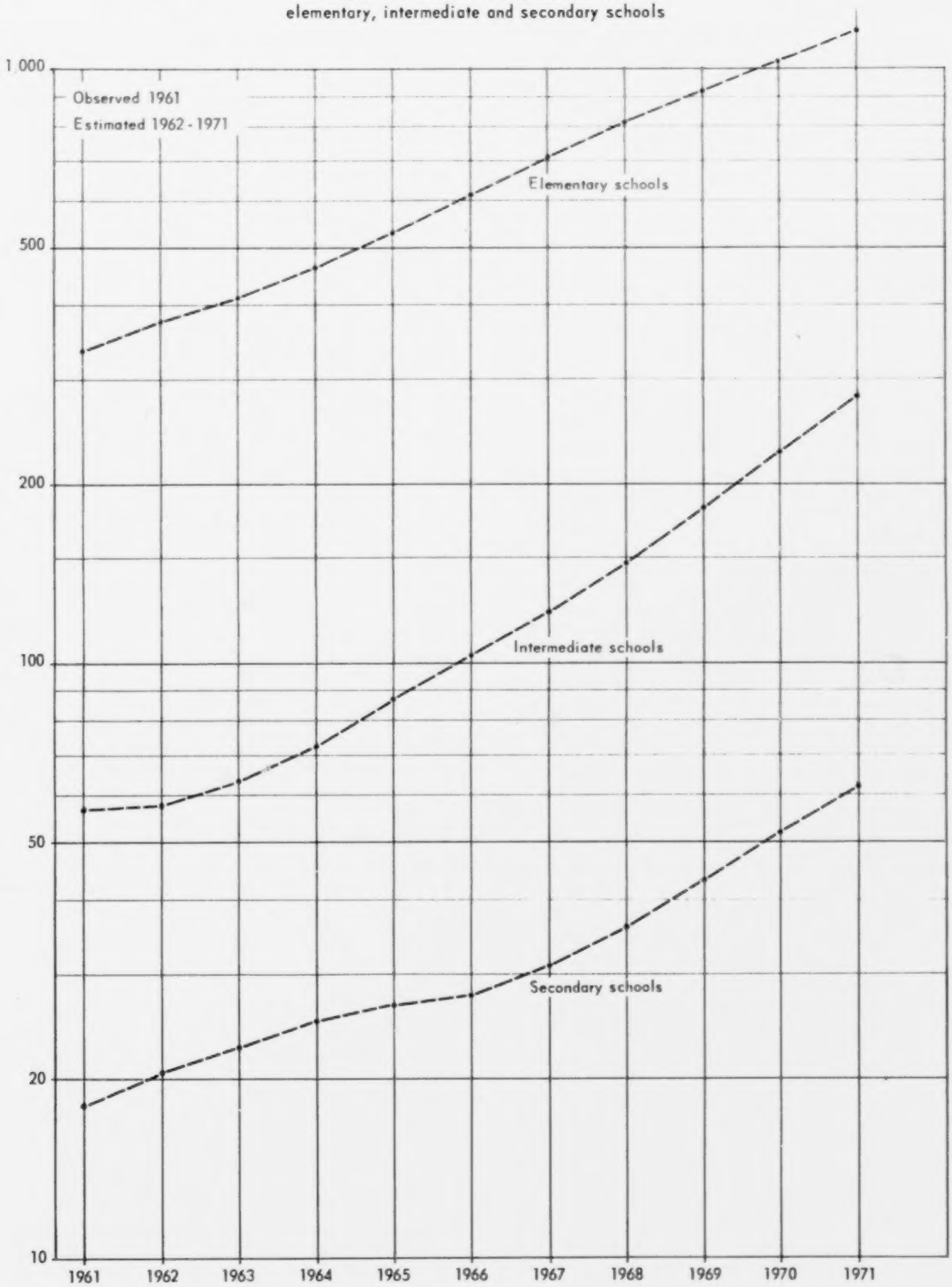
Table VI-24 Sudan: *Estimated number of teachers required by level of education, based on assumed pupil-teacher ratios, 1960-1971*

(Thousands of teachers)

Year	Elementary		Intermediate		Secondary	
	Pupil teacher ratio	Number of teachers	Pupil teacher ratio	Number of teachers	Pupil teacher ratio	Number of teachers
Observed:						
1960	42	•7.6	20	•2.4	15	•0.9
1961	41	•8.2	20	•2.8	14	•1.3
Estimated:						
1962	41	9.1	20	2.9	15	1.4
1963	41	10.0	21	3.0	16	1.4
1964	40	11.6	22	3.3	17	1.5
1965	40	13.2	23	3.8	18	1.5
1966	40	15.3	24	4.3	19	1.5
1967	39	18.2	25	4.9	20	1.6
1968	38	21.3	27	5.5	22	1.6
1969	37	24.8	30	6.1	24	1.8
1970	36	28.6	33	6.9	26	2.0
1971	35	32.9	35	8.0	28	2.2

• Estimated on the basis of observed pupil-teacher ratios for public schools only.

Chart VI-1. Sudan: Total enrolment in elementary, intermediate and secondary schools



CHAPTER VII

SOME EXAMPLES OF SCHOOL ENROLMENT PROJECTIONS FROM MORE DEVELOPED COUNTRIES

1. NATURE OF THIS CHAPTER

In this chapter we shall cite some examples of work done in recent years on school enrolment projections in some of the educationally more developed countries. While it must be remembered that the particular methods used in each country may not be entirely applicable to another country, and the problems of estimating future school enrolment in a developing country are in many ways more difficult than in the more developed countries, there is nevertheless much that can be learned from a study of how the work is done in different countries. Furthermore, the methods employed in estimating or projecting future school enrolment, in the countries from which we have selected our examples, are basically quite similar – as we shall see presently – but the various ways in which these basic methods are applied to the particular situations are interesting to observe. It is hoped that a study of these examples will help the technician in less developed countries to understand better the general methodology as presented and illustrated in the present Manual, to have more confidence in his own work, and to strive for better results as he continues in is endeavours.

For convenience, and mainly because we have the information readily available, we shall take our examples from three countries only: the United States, New Zealand, and France. This does not mean that similar work has not been done in other countries, but limitations of time and space compel us to restrict our selection to these examples. In the case of the United States, we shall cite two examples of school enrolment projections at the national level, one example of work done by a regional organization interested in the educational development of a group of States, and one example of enrolment projections for a single State and its component local areas. For New Zealand, we shall in particular compare the results of two projections made about ten years apart with actual enrolment data from recent reports, and note how closely the projections have approximated actual enrolment. France offers an example of a long-term projection covering a period of 30 years, made in the face of a proposal for the prolongation of the period of compulsory education.

2. SCHOOL ENROLMENT PROJECTIONS IN THE UNITED STATES

(a) *Bureau of the Census*[1]

In a country like the United States, where education at the first and second levels had become fairly universal, any changes in future school enrolment will be the result mainly of changes in the size of the school-age population. The Bureau of the Census not only keeps close watch on the factors which influence the size, composition and distribution of the population as a whole, but also pays particular attention to the changes in the educational characteristics of the population: school attendance, literacy and educational attainment. Based on census enumeration and current sample surveys of households, it has published special reports on these topics from time to time. Projections of school enrolment were first published in 1949, and again in 1953.[2]

The most recent report on this subject, entitled "Illustrative projections to 1980 of school and college enrolment in the United States", was published in June 1961.[3] Whereas the earlier reports covered school enrolment only at the first two levels of education (kindergarten through high school) and for relatively short periods of time (through 1960 and 1965), the latest report includes also higher education and extends the period of projection approximately 20 years into the future.

Starting with three series of population projections, based on alternative assumptions of future trends in fertility, and four series of projections on school enrolment rates by age, the report presents eleven projections of school enrolment by level of education for 1980, as shown in table VII-1.

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[1] We are indebted to Mr. Jacob S. Siegal, Chief, Populations Estimates and Projections Branch, Bureau of the Census, for permission to quote from the Bureau's publications consulted by us and used for the present study.

[2] United States. Bureau of the Census. *Current population reports*, Series P-25, No. 18, February 14, 1949, "Forecasts of population and school enrolment in the United States: 1948 to 1960"; *Current population reports*, Series P-25, No. 85, December 7, 1953, "Projections of school enrolment in the United States: 1953 to 1965".

[3] United States. Bureau of the Census. *Current population reports*, Series P-25, No. 232, June 22, 1961, "Illustrative projections to 1980 of school and college enrolment in the United States".

It may be seen from table VII-1 that the choice of a particular population series has the most effect on the size of enrolment projections at the elementary school level (since the elementary school pupils of 1980 have not yet been born), but that the size of the projected college enrolment varies much more according to the choice of assumptions regarding future enrolment rates (since most of the college students of 1980 have already been born, and college enrolment rates may be subject to large increases as compared with the limited possibilities for increase at the lower levels).

Of course one is confronted here with the "embarrassment of choice", as to which of the eleven series should be used for purposes of educational planning. Some help is given by the report itself which presents the greatest detail for four of the eleven series: II-A, II-C, III-A, and III-C. A summary of these four projections, at five-year intervals, 1965, 1970, 1975 and 1980, together with comparative estimates for 1950, 1955, and 1960, is reproduced here as table VII-2.

Table VII-1. United States : *Projections of school enrolment for the civilian non-institutional population 5 to 34 years old, by level of school : 1980*

(In thousands. Figures are for fall of year)

Enrolment series[1]	Total enrolment	Elementary school or kindergarten	High school	College
II-A	75 102	48 696	17 388	9 018
II-B	73 383	48 683	16 943	7 757
II-C	70 828	47 936	16 385	6 507
II-D	69 267	47 928	15 847	5 492
III-A	66 290	41 797	15 678	8 815
III-B	64 629	41 788	15 264	7 577
III-C	62 245	41 151	14 752	6 342
III-D	60 748	41 140	14 258	5 350
IV-A	57 419	34 861	13 959	8 599
IV-B	55 809	34 852	13 568	7 389
IV-C	53 598	34 322	13 089	6 187

1. Population series II implies a continuation to the end of the projection period of the fertility levels experienced in the 1955-1957 period; series III implies a decline from the 1955-1957 fertility level to the 1949-1951 level by the middle of the projection period, with fertility then remaining constant to 1980; series IV implies a decline from the 1955-1957 level to the 1942-1944 level by 1965 to 1970, and then a leveling off. These alternatives are combined with the following assumptions about enrolment rates: series A implies a continued increase in enrolment rates by age with some leveling off by future dates; series C assumes that enrolment percentages will remain constant at the 1955-1957 average annual level to 1980; series B represents a trend in enrolment rates roughly intermediate between series A and C; series D assumes that enrolment rates may drop for a while at the upper high school and college ages.

Source : United States. Bureau of the Census. *Current population report*, Series P-25, No. 232.

For these four series the report gives annual projections, by level of school and sex, for the entire period 1960-1980, but cautions the reader that "annual changes in enrolment implied by the enrolment projections are not offered as reliable estimates in themselves", since "*estimates of annual change in enrolment are subject to considerably greater error than the enrolment projections*". (Italics are ours).

The general method used in these projections, as explained in the report, " involved projecting enrolment rates by single year of age and sex for October of each year to 1980 and applying these rates to projections of the population by single years of age and sex ". With regard to the distribution of total enrolment by level of school, " the assumption was made that, within each age group, the average percentage distribution by level of enrolment for 1958-1960 would remain unchanged to 1980 ". A detailed table giving projections of school enrolment by level of school, age and sex, for 1965, 1970, 1975, and 1980 is reproduced in part as table VII-3.

The report points out that information obtained from reports of school systems and institutions of higher learning (such as is found in the Biennial Survey of the Office of Education), is not strictly comparable to the data collected by the Bureau of the Census through household interviews, because of differences in definitions, time references, etc. This observation should be borne in mind when we proceed to look at our next example, taken from published and unpublished sources of the Office of Education.

Table VII-2. United States : *School enrolment by level of school, estimated 1950 to 1960, and projected 1965 to 1980*

(In thousands. Figures are for fall of year)

Level of education and enrolment series	Estimated			Projected			
	1950	1955	1960	1965	1970	1975	1980
All school levels							
II-A	30 276	37 426	46 259	54 360	60 344	66 721	75 102
II-C				52 488	57 286	62 834	70 828
III-A				54 360	58 739	61 659	66 290
III-C				52 488	55 731	57 867	62 245
Elementary school or kindergarten							
II-A	21 406	27 086	32 441	35 755	38 430	42 411	48 696
II-C				35 402	37 915	41 764	47 936
III-A				35 755	36 825	37 558	41 797
III-C				35 402	36 360	37 001	41 151
High school							
II-A	6 656	7 961	10 249	13 226	14 894	15 985	17 388
II-C				12 711	14 110	15 042	16 385
III-A				13 226	14 894	15 776	15 678
III-C				12 711	14 110	14 838	14 752
College or professional school							
II-A	2 214	2 379	3 570	5 379	7 020	8 325	9 018
II-C				4 375	5 261	6 028	6 507
III-A				5 379	7 020	8 325	8 815
III-C				4 375	5 261	6 028	6 342

Source : United States. Bureau of the Census. *Current population reports*, Series P-25, No. 232, " Illustrative projections to 1980 of school and college enrolment in the United States ".

Table VII-3 United States : *School enrolment for the civilian non-institutional population 5 to 34 years old, by level of school, age and sex, estimated 1960 and projected 1965, 1970, 1975 and 1980.*[1]

(In thousands. As of October 1)

Date and age (years)	Male			Female		
	Elementary school or kindergarten	High school	College	Elementary school or kindergarten	High school	College
1960 (estimate)						
5 and 6	3 292	-	-	3 146	-	-
7-13	12 780	294	-	12 216	331	-
14-17	635	4 514	99	364	4 507	123
18-21	4	339	1 237	2	200	852
22-24	-	8	411	-	16	98
25-34	-	29	592	2	11	158
1965						
5 and 6	3 559	-	-	3 438	-	-
7-13	14 015	296	-	13 413	338	-
14-17	824	5 885	129	485	5 724	159
18-21	7	532	1 924	5	305	1 303
22-24	2	30	637	1	18	186
25-34	2	57	819	4	41	222
1970						
5 and 6	3 971	-	-	3 828	-	-
7-13	14 890	329	-	14 252	377	-
14-17	921	6 616	145	542	6 430	178
18-21	8	599	2 496	6	345	1 632
22-24	3	43	926	1	27	272
25-34	3	75	1 080	5	53	291
1975						
5 and 6	4 538	-	-	4 373	-	-
7-13	16 324	340	-	15 601	389	-
14-17	973	7 065	158	572	6 860	195
18-21	9	687	2 887	6	393	1 871
22-24	3	50	1 063	1	31	309
25-34	4	101	1 459	7	69	383
1980						
5 and 6	5 257	-	-	5 063	-	-
7-13	18 738	384	-	17 900	439	-
14-17	1 074	7 693	167	631	7 462	204
18-21	9	716	3 047	7	407	1 960
22-24	4	55	1 180	1	34	339
25-34	4	117	1 677	8	81	444

1. Series II-A. (Similar details are given in the source for Series II-B, II-C, II-D, III-A, III-B, III-C).

Source : United States. Bureau of the Census. *Current population reports*, Series P-25, No. 232.

(b) *Office of Education*[1]

The U.S. Office of Education, in the Department of Health, Education, and Welfare, publishes the *Biennial Survey of Education* and other current reports on education in the United States. In recent years it has also engaged in projections of future school enrolment. A report containing projections for the school years 1964-1965 to 1979-1980, at five-year intervals, was published in 1962.[2]

This report presents four series of projections, based on alternative assumptions, which are summarized as follows:

Steps	*Series A*	*Series B and B'*	*Series C*
1. Population by age group	Fertility constant at 10 per cent over 1955-1957 level	Fertiliy constant at 1955-1957 level	Fertility constant at 1955-1957 level
2. Percentage of population enrolled in grades K-12, by age group	Higher than 1950-1960 trend	Projection of 1950-1960 trend	Constant at 1957-1959 level
3. Split of K-12 enrolment between K-8 and 9-12, by age group	Projection of 1950-1960 trend	B: Projection of 1950-1960 trend	Constant at 1957-1959 level
4. Split of K-8 and 9-12 enrolment between public and non-public	Projection of 1950-1960 trend	B : Projection of 1950-1960 trend B': Constant at 1957-1959 level	Constant at 1957-1959 level
5. School-year enrolment as percentage of fall enrolment, by level and control	Constant at average for 1955-1956 and 1957-1958	Same as Series A	Same as Series A
6. Enrolment in 50 States and the District of Columbia as percentage of enrolment in 48 States and the District of Columbia, by level and control	Same for all Series: Constant percentage for each level by control (grades K-8 and 9-12, public and non-public)		

A comparison of these alternative assumptions with those stated in the Bureau of the Census report shows that the Series A projection of the Office of Education (involving an increase in the fertility level) would tend to be higher than any of the Census Bureau projections as published in their report (which assume constant and declining levels of fertility). Series B and B' of the Office of Education would tend to be roughly similar to the Series II-A and II-B projections of the Bureau of the Census. Exact correspondance is to be found between Series C of the Office of Education and Series II-C of the Census Bureau, both based on identical assumptions. Finally, all the series III and IV of the Census Bureau projections, based on declining levels of fertility, would tend to be lower than any of the Office of Education series, which are based on constant and increasing fertility.

Apart from these differences due to their basic assumptions, the Census Bureau figures refer to enrolment as of October 1 of each year; the Office of Education report presents both fall enrolment and school-year enrolment. The latter, which includes all pupils enrolled during the school year, is by definition higher than fall enrolment, which counts only those pupils who enter school at the beginning of the school year. Furthermore, the Office of Education, which receives its data from State and local school systems, may include some double counting of pupils who attend more than one school during the same school year. On the other hand, the Bureau of the Census, which bases its figures on the results of household sample surveys, admits that these figures may be subject to sampling variability.

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[1] We are indebted to Mr. Kenneth A. Simon, Chief, Reference, Estimates and Projections Section, Office of Education, for consultations and for permission to quote from the reports used in this study.

[2] United States. Department of Health, Education, and Welfare. Office of Education. *Enrolment in public and non-public elementary and secondary schools,* 1950-1980, by Kenneth A. Simon.

There are also a few formal differences in presentation between the two reports. The Census Bureau report gives enrolment projections by age and sex, and by three levels of education : elementary school or kindergarten, high school, and college. The Office of Education report does not show separate figures for each sex, but shows a further distribution between public and non-public schools.

Keeping in mind these factors of non-comparability between the two reports, we shall now give some further attention to details presented in the report of the Office of Education, in order to understand more clearly its methodology.

Step 1. *Projections of the school-age population.* The Office of Education used two series of population projections provided by the Bureau of the Census (Series I and II), relating to the civilian non-institutional population, as of 1 October, in 48 States and the District of Columbia, as shown in table VII-4. As noted above, Series I of the population estimates was used as basis for enrolment projection Series A ; while Series II of the population estimates was used for enrolment projections Series B and C.

Step 2. *Projections of the percentage of population enrolled in school.* Adopting three alternative assumptions on future trends in school enrolment as percentage of each age group, the Office projected these percentages up to the fall of 1979 in three series, as shown in table VII-5. For persons aged 20 years and over, it was assumed that a certain number, between 100,000 and 200,000, would be enrolled in grades 9-12 during the period covered by the projections.

Step 3. *Distribution of projected enrolment by level of education.* It was assumed that the proportion of pupils at each age to be found enrolled in kindergarten, grades 1-8 and 9-12 would either : (a) change according to the trend observed during the 1950-1960 period ; or (b) remain constant at the 1957-1959 level. It was further assumed that a constant number of pupils aged 18-19 would be enrolled in grades 1-8 each year. The results are shown in table VII-6.

Step 4. *Distribution of projected enrolment between public and non-public schools.* The distribution of total enrolment, at each level of education, between public and non-public schools was assumed either : (a) to continue the trend observed during the 1950-1960 period ; or (b) to remain constant at the 1957-1959 level. It will be observed that under the first assumption the proportion of total enrolment in non-public schools will further increase ; but that under the second assumption there will be no further increase in this proportion. The projections based on these assumptions are shown in table VII-7.

Step 5. *Conversion of fall enrolment projections to school-year enrolment.* Thus far the projections have been made in terms of fall enrolment, because the basic data on population and enrolment were taken from Census Bureau sources. In order to make the enrolment projections more comparable to the current statistics of the Office of Education, the fall enrolment figures were converted to school-year basis by assuming a constant relationship between fall enrolment and school-year enrolment for each level of school, public and non-public. As expected, the school-year enrolment had been found to be generally higher than the fall enrolment, with one unexplained exception. The ratios of school-year enrolment to fall enrolment, based on an average, of two years' experience - 1955-1956 and 1957-1958 - were found to be as follows :

Public schools %		Non-public schools %	
Kindergarten	117.6	Kindergarten to grade 8	100.8
Grades 1-8	103.2	Grades 9-12	104.6
Grades 9-12	96.6		

These ratios were applied as constant multipliers in converting the projected fall enrolment figures to school-year enrolment.

Table VII-4 United States : *Estimated and projected population 5-19 years of age, by age groups, 1949-1979*[1]

(In thousands)

Age Group	Estimated population[2]		Projected population[3]			
			Series I		Series II	
	1949	1959	1969	1979	1969	1979
5	2 773	3 934	4 972	6 604	4 499	5 974
6	2 874	3 844	4 851	6 413	4 393	5 815
7–9	7 266	10 964	14 011	18 110	12 866	16 467
10–13	8 805	13 806	17 345	21 751	16 588	19 808
14–15	4 147	5 460	7 929	10 055	7 929	9 116
16–17	4 126	5 447	7 522	9 491	7 522	8 630
18–19	4 062	4 353	6 644	8 509	6 644	7 852

1. Civilian non-institutional population, as of 1 October, in 48 States and the District of Columbia.
2. Based on data in U.S. Bureau of the Census, *Current population reports*, Series P-20 and P-25, 1949-1959.
3. Based on data in U.S. Bureau of the Census, *Current population* reports, Series P-25, No. 187, Nov. 10, 1958; and unpublished data of the Bureau.

Source : United States. Department of Health, Education, and Welfare. Office of Education. *Enrolment in public and non-public elementary and secondary schools*, 1950-1980.

Table VII-5 United States : *Fall enrolment in grades K-12 of regular public and non-public schools, as percentage of population, by age groups, 1949-1979*

Age Group	Estimated Percentage[1]		Projected percentage[2]					
			Series A		Series B, B'		Series C	
	1949	1959	1969	1979	1969	1979	1969	1979
5	55.1	62.9	74.5	83.0	69.5	73.9	62.3	62.3
6	96.2	97.5	99.0	99.8	98.6	99.5	97.4	97.4
7-9	98.5	99.4	99.7	99.8	99.5	99.5	99.5	99.5
10-13	98.7	99.4	99.7	99.8	99.5	99.5	99.5	99.5
14-15	93.5	97.5	99.8	99.8	98.9	99.5	97.2	97.2
16-17	66.4	79.1	87.8	92.0	85.1	88.6	77.7	77.7
18-19	9.3	9.7	11.8	12.5	10.3	10.3	10.3	10.3

1. Based on data in U.S. Bureau of the Census, *Current population reports*, Series P-20 and P-25, 1949-1959.
2. Series A : higher than 1950-1960 trend ; Series B and B' : based on 1950-1960 trend ; Series C : constant at 1957-1959 level.

Source : see table VII-4.

Table VII-6 United States: *Fall enrolment in kindergarten, grades 1-8, and grades 9-12 of regular public and non-public schools, as percentage of total K-12 enrolment, by age groups, 1949-1979*

Estimated or Projected	Year	Level	Age groups							
			5	6	7-9	10-13	14-15	16-17	18-19	20 and over
Estimated	1949	Kindergarten	60.8	1.1	0	0.0	0.0	0.0	0.0	0
		Grades 1-8	39.2	98.9	100	95.1	24.3	3.8	0.5[1]	0
		Grades 9-12	0.0	0.0	0	4.9	75.7	96.2	99.5	100
	1959	Kindergarten	78.7	2.2	0	0.0	0.0	0.0	0.0	0
		Grades 1-8	21.3	97.8	100	96.7	17.5	1.8	0.2[1]	0
		Grades 9-12	0.0	0.0	0	3.3	82.5	98.2	99.8	100
Projected: Series A, B, B'	1969	Kindergarten	87.9	3.8	0	0.0	0.0	0.0	0.0	0
		Grades 1-8	12.1	96.2	100	95.9	12.7	0.9	0.2[1]	0
		Grades 9-12	0.0	0.0	0	4.1	87.3	99.1	99.8	100
	1979	Kindergarten	91.8	4.1	0	0.0	0.0	0.0	0.0	0
		Grades 1-8	8.2	95.9	100	96.2	9.8	0.4	0.2[1]	0
		Grades 9-12	0.0	0.0	0	3.8	90.2	99.6	99.8	100
Series C	1969 and 1979	Kindergarten	77.1	2.8	0	0.0	0.0	0.0	0.0	0
		Grades 1-8	22.9	97.2	100	95.9	17.6	2.0	0.2[1]	0
		Grades 9-12	0.0	0.0	0	4.1	82.4	98.0	99.8	100

1. Projected as a constant number. About 22,000 persons aged 18-19 are enrolled in grades 1-8 each year

Source: see table VII-4

Table VII-7 United States: *Fall enrolment by level, public and non-public, as percentage of total enrolment at each level, of regular public and non-public schools, 1949-1979*

Level of school	Public or non-public	Estimated Percentage[1]		Projected Percentage[2]		
				Series A and B		Series B' and C
		1949	1959	1969	1979	1969 and 1979
Kindergarten	Public	86.6	82.6	80.2	78.6	80.7
	Non-public	13.4	17.4	19.8	21.4	19.3
Grades 1-8	Public	88.3	84.0	81.1	79.0	84.4
	Non-public	11.7	16.0	18.9	21.0	15.6
Grades 9-12	Public	91.1	89.1	87.7	86.4	89.5
	Non-public	8.9	10.9	12.3	13.6	10.5

1. Based on data in U.S. Bureau of the Census, *Current population reports*, Series P-20 and P-25, 1949-1959.
2. Series A and B: based on 1950-1960 trend; Series B' and C: Constant at 1957-1959 level.

Source: See table VII-4.

Table VII-8 United States : *School-year enrolment in grades K-8 and 9-12 of regular public and non-public day schools, 1949-1950 to 1969-1970.*[1] (Numbers are in thousands. *Projections, Series B', as of March 1962; revised March 1963*)

School year	Total public and non-public		Public		Non-public	
	K-8	9-12	K-8	9-12	K-8	9-12
			Actual		*Estimated*	
1949-1950	22 199	6 433	19 464	5 752	2 735	681
1951-1952	23 947	6 573	20 770	5 908	3 177	665
1953-1954	26 262	7 071	22 649	6 315	3 613	756
1955-1956	28 317	7 735	24 413	6 901	3 904	834
1957-1958	30 120	8 833	25 801	7 895	4 319	938
1959-1960	32 242	9 520	27 602	8 485	4 640	1 035
			Estimated			
1960-1961	33 300	10 000	28 400	8 900	4 900	1 100
1961-1962	33 800	10 700	28 700	9 500	5 100	1 200
1962-1963	34 800	11 600	29 400	10 300	5 400	1 300
			Projected			
1963-1964	35 500	12 300	30 000	10 900	5 500	1 400
1964-1965	36 100	12 800	30 500	11 400	5 600	1 400
1965-1966	36 700	13 000	31 000	11 600	5 700	1 400
1966-1967	37 300	13 300	31 500	11 800	5 800	1 500
1967-1968	37 800	13 600	32 000	12 000	5 800	1 600
1968-1969	38 300	14 000	32 400	12 400	5 900	1 600
1969-1970	38 800	14 400	32 800	12 800	6 000	1 600

1. Does not include residential schools for exceptional children, subcollegiate departments of institutions of higher education, and Federal schools for Indians.

Source : United States. Department of Health, Education and Welfare. Office of Education. Division of Educational Statistics (Reference, Estimates and Projections Section).

Table VII-2 United States : *Total fall and first-time fall college enrolment to 1975 : aggregate U.S., actual 1950-1962 ; projected 1963-1975.* (Numbers rounded to thousands. *Projections as of October 1962)*

Fall of	Total fall enrolment			First-time fall enrolment		
	Total	Men	Women	Total	Men	Women
Actual :						
1950	2 297	1 569	727	517	320	197
1951	2 116	1 399	718	472	280	192
1952	2 148	1 387	761	537	324	213
1953	2 251	1 432	818	572	345	227
1954	2 469	1 575	893	631	387	245
1955	2 679	1 747	931	675	418	257
1956	2 947	1 928	1 019	723	446	277
1957	3 068	2 003	1 065	730	445	284
1958	3 259	2 110	1 148	781	469	312
1959	3 402	2 174	1 228	827	491	336
1960	3 610	2 271	1 339	930	543	387
1961	3 891	2 424	1 467	1 026	596	430
1962	4 207	2 603	1 604	1 039	602	437
Projected :						
1963	4 419	2 743	1 676	1 117	669	448
1964	4 810	2 980	1 830	1 313	791	522
1965	5 257	3 254	2 003	1 426	859	567
1966	5 708	3 527	2 181	1 444	869	575
1967	6 117	3 772	2 345	1 454	872	582
1968	6 442	3 958	2 484	1 492	892	600
1969	6 721	4 111	2 610	1 535	916	619
1970	7 007	4 268	2 739	1 581	940	641
1971	7 326	4 453	2 873	1 628	964	664
1972	7 663	4 654	3 009	1 668	985	683
1973	8 006	4 864	3 142	1 700	1 002	698
1974	8 354	5 083	3 271	1 737	1 022	715
1975	8 677	5 286	3 391	1 762	1 035	727

Source : United States. Department of Health, Education and Welfare. Office of Education, Division of Educational Statistics (Reference, Estimates and Projections Section).

Step 6. *Conversion of incomplete national figures to projections for total United States.* This step in computation was necessitated by the fact that Alaska and Hawaii, which became the 49th and 50th States of the Union in 1959, were not previously included in national population and school statistics relating to the United States as a whole. Hence, separate projections had to be made for these two new States and the results added to projections prepared for the 48 States and the District of Columbia. Final results were therefore presented for the 50 States and the District of Columbia, in two tables, relating to (a) school-year enrolment, and (b) fall enrolment, in four alternative series A, B, B', and C, as explained above.

The reader who may be interested in these detailed tables should consult the original report of the Office of Education. However, since the publication of that report, the Office of Education has revised its estimates for 1959-1960 enrolment and its projections for the 1965-1980 period, based on the Series B', which we have reproduced in table VII-8. In addition, a series of annual projections for college enrolment, showing separately the total fall enrolment and the fall enrolment of first-time students, have also been prepared subsequently to the publication of the above-mentioned report. These projections, for the period 1963 to 1975, together with actual enrolment data for the years 1950 to 1962, are reproduced in table VII-9.

(c) *Southern Regional Education Board*[1]

Among various organizations in the United States concerned with the development of education on a regional basis, we shall take one example of school enrolment projections made for a number of States within a given region. The Southern Regional Education Board is primarily interested in the development of higher education in fourteen States, all situated in the Southern part of the United States.[2] These States are distinguished mainly by the fact that they have large proportions of non-white population, involving some peculiarly difficult problems of education.

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[1] We are indebted to Mr. E.F. Schietinger, Research Associate, Southern Regional Education Board, who kindly supplied us with the relevant publications used in the present study, and gave us permission to quote therefrom.

[2] Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia.

Table VII-10 United States, Southern Region: *Ratio of college enrolment to population aged 18-21 years in 1940 and 1952*

State	White		Negro	
	1940	1952	1940	1952
Alabama	10.8	14.3	4.7	7.8
Arkansas	8.4	13.8	2.8	7.0
Florida	10.1	20.4	4.4	6.3
Georgia	11.6	16.4	4.1	6.8
Kentucky	10.5	13.1	6.1	3.9
Louisiana	19.6	21.7	3.8	8.4
Maryland	15.4	26.6	3.6	8.5
Mississippi	14.7	18.8	1.2	3.1
North Carolina	12.3	14.2	5.5	9.2
Oklahoma	19.7	25.0	4.7	3.8
South Carolina	13.7	16.9	3.6	4.6
Tennessee	11.5	15.9	8.8	10.8
Texas	16.6	23.6	6.9	12.1
Virginia	13.8	14.6	5.7	7.6
Southern Region	*13.7*	*18.5*	*4.5*	*7.4*

Source: Southern Regional Education Board. *Some methods for projecting school and College enrolments.*

Table VII-11 Alabama : *Illustrative ratio projections of regular session college enrolment for white students, 1951-1952 to 1969-1970*

Year	College age population	Per cent in college	Estimated enrolment
1951-1952	136 021	14.3	19 477
1952-1953	137 339	14.7	20 189
1953-1954	137 233	15.1	20 722
1954-1955	137 020	15.5	21 238
1955-1956	137 458	15.8	21 718
1956-1957	135 333	16.2	21 924
1957-1958	135 199	16.6	22 443
1958-1959	138 106	17.0	23 478
1959-1960	139 923	17.4	24 347
1960-1961	147 134	17.8	26 190
1961-1962	154 041	18.1	27 881
1962-1963	155 588	18.5	28 784
1963-1964	154 873	18.9	29 271
1964-1965	161 932	19.3	31 253
1965-1966	166 285	19.7	32 758
1966-1967	170 082	20.1	34 186
1967-1968	176 184	20.5	36 118
1968-1969	172 603	20.9	36 074
1969-1970	170 459	21.3	36 308

Source : See table VII-10.

A report on " Future school and college enrolments in the Southern region ", was published in 1954, accompanied by a manual describing some of the methods used, and adjustments made, in arriving at the "best possible enrolment forecasts for each State in the Southern Regional Education Compact for as many future years as could be dealt with accurately".[1] The manual sets forth in considerable detail the methods used in the course of the work in making the enrolment projections ; it provides an interesting example of testing the efficacy of two different methods commonly used, namely, the " enrolment ratio " method and the " cohort survival " method.

The use of the " enrolment ratio " method for projecting college enrolment is illustrated in tables VII-10 and VII-11, reproduced from the above-mentioned work. Table VII-10 shows the ratio of college enrolment to the population aged 18-21 years in 1940 and in 1952, for each of the Southern States, separately for the white and Negro population. Table VII-11 shows how the future college enrolment for white students in the State of Alabama was projected up to 1969-1970 by assuming a uniform increase each year of the enrolment ratio.

The use of the " cohort-survival " method to project public school enrolment is illustated in tables VII-12 and VII-13, relating to reported enrolment in white elementary schools from 1940-1941 to 1951-1952, from which " survival-rates " between grades are computed. The steps in the whole process of preparing enrolment projections by this method are set out in the manual. An essential feature of this procedure is to relate the number of recorded births seven years earlier to the reported enrolment in grade 2 of a given year. It was found that births "survived" to first grade enrolment six years later resulted in survival rates subject to too much fluctuation as compared with the grade-to-grade survival rates. It was also recommended that recorded births be adjusted for under-registration (that is, allowance must be made for the fact that recorded births generally fall short of the actual number of children born, the amount of under-registration depending on the efficacy of the birth registration system). Furthermore, adjustment must be made according to regulations of the State concerning the minimum age at which children are admitted to school. For example, if a child must be six before 1 October to be admitted to school in September the adjustment would consist of taking 1/4 of the previous year's births and 3/4 of the current year's births.

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[1] Southern Regional Education Board. *Some methods for projecting school and college enrolments*, by John K. Folger. Atlanta, 1955.

Table VII-12 Alabama: *Enrolment by grade in white elementary schools, 1940-1951*

School year	Number of pupils by grade							
	1	2	3	4	5	6	7	8
1940-1941	56 258	45 835	48 143	47 033	46 851	44 431	38 707	30 729
1941-1942	55 654	46 602	45 400	46 350	44 889	43 563	40 787	32 133
1942-1943	54 609	46 718	45 577	44 221	44 810	42 024	40 538	34 287
1943-1944	54 024	45 460	44 614	43 562	41 945	40 942	38 603	32 687
1944-1945	54 763	44 998	43 857	43 172	41 335	38 572	37 726	31 774
1945-1946	53 721	45 821	44 225	42 637	41 256	38 762	36 405	32 333
1946-1947	52 513	45 015	44 373	42 568	40 850	38 368	36 460	31 140
1947-1948	52 042	45 717	44 164	43 250	41 446	38 747	36 753	31 726
1948-1949	52 711	46 142	44 345	42 726	41 861	39 228	37 274	32 228
1949-1950	64 053	47 162	45 185	43 054	41 710	39 998	38 043	33 282
1950-1951	45 495	56 881	46 280	43 982	41 938	40 205	38 724	33 699
1951-1952	47 957	42 411	54 828	44 818	42 726	40 352	38 979	34 422

Source: See table VII-10.

Table VII-13 Alabama: *Grade cohort "survival rates" computed from enrolment data by grade, in white elementary schools, 1940-1951*

Between school years	Survival rates[1] from grades						
	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8
1940 and 1941	.8284	.9905	.9628	.9544	.9298	.9180	.8302
1941 and 1942	.8394	.9780	.9740	.9668	.9362	.9306	.8406
1942 and 1943	.8325	.9550	.9558	.9485	.9137	.9186	.8063
1943 and 1944	.8329	.9647	.9677	.9489	.9196	.9214	.8231
1944 and 1945	.8367	.9828	.9722	.9556	.9378	.9438	.8570
1945 and 1946	.8379	.9684	.9625	.9581	.9300	.9406	.8554
1946 and 1947	.8706	.9811	.9747	.9736	.9485	.9579	.8702
1947 and 1948	.8866	.9700	.9674	.9679	.9465	.9620	.8769
1948 and 1949	.8947	.9793	.9709	.9762	.9555	.9698	.8929
1949 and 1950	.8880	.9813	.9734	.9741	.9639	.9681	.8858
1950 and 1951	.9322	.9639	.9684	.9714	.9622	.9695	.8889

[1] Survival rates are computed by dividing the enrolment in a given grade by the enrolment in the next lower grade the year before. For example, grade 1 enrolment in 1940-1941 was 56,258; grade 2 enrolment in 1941-1942 was 46,602. Dividing 46,602 by 56,258 gives .8284.

Source: See table VII-10

Finally, by means of a linear regression equation, or simply by taking an average of the survival rates computed for a selected number of years, these rates may be projected into the future; applying the projected rates to the present enrolment by grade, and the number of births suitably adjusted, results in estimates of future enrolment.

It is interesting to note that the author of this regional study had tried the two methods thus outlined - the "enrolment ratio" method and the "cohort survival" method - on certain school enrolment data for a short-term projection of public school enrolment, and had found that the error of estimation was on the whole much greater by the ratio method than by the cohort method. He gave two examples of his comparison between the two methods. Table VII-14 reproduces one of his examples, based on estimated enrolment by grade, for white and Negro schools in North Carolina, compared with actual enrolment, for 1951 and 1952. The difference between the two methods is quite substantial for grades 10 to 12 in white schools and for grades 8 to 11 in Negro schools. For total enrolment in grades 1-12, Negro schools, the estimated enrolment by the "ratio" method was 11 to 12 per cent below the actual enrolment, whereas the results of the "cohort" method were off by less than 1.5 per cent.

Table VII-14 North Carolina: *Percentage errors in estimation of school enrolment in White and Negro schools, 1951 and 1952, by two different methods.*[1]

Grade	White schools				Negro schools			
	1951		1952		1951		1952	
	Ratio method	Cohort method	Ratio method	Cohort method	Ratio method	Cohort method	Ratio method	Cohort method
1	- 2.3	- 1.6	- 1.7	- 4.8	- 10.7	+ 5.9	- 7.7	+ 7.2
2	- 6.3	+ 1.3	- 0.1	- 0.2	- 9.9	- 7.0	- 6.1	- 1.1
3	+ 0.2	- 0.9	- 4.2	+ 0.8	- 4.8	- 0.1	- 7.6	- 5.0
4	- 1.6	- 1.5	- 1.8	- 1.6	- 7.6	- 2.5	- 6.6	+ 0.3
5	- 1.3	- 1.3	- 0.2	- 2.5	- 4.7	- 1.2	- 4.4	- 3.6
6	- 3.3	- 2.1	- 0.9	- 2.6	- 6.4	- 0.8	- 8.4	- 2.1
7	- 5.2	- 2.9	- 4.2	- 3.8	- 1.0	- 3.5	- 7.6	- 4.8
8	+ 4.8	- 2.3	+ 1.7	- 5.1	- 16.3	- 3.8	- 19.5	+ 2.8
9	- 0.6	- 1.2	+ 0.1	- 1.7	- 35.6	- 6.9	- 33.9	- 1.0
10	+ 12.0	0.0	+ 10.8	- 0.8	- 38.9	- 3.5	- 39.6	- 9.2
11	- 13.8	- 0.2	- 16.9	+ 1.2	- 34.5	- 6.6	- 38.6	- 7.7
12	+ 3.3	- 1.0	+ 12.9	+ 3.2	+ 1.7	- 0.8	+ 1.0	- 4.4
Total	*+ 1.5*	*- 1.2*	*- 0.4*	*- 1.8*	*- 11.4*	*- 1.3*	*- 12.2*	*- 1.4*

1. Estimates for 1951 and 1952 were based on data up to 1950, then compared with actual enrolment in 1951 and 1952. Minus sign indicates that estimate was lower than actual enrolment, the latter being the base for all percentages.

Source: See table VII-10.

In dealing with college enrolment projections, one difficulty in applying the cohort survival method is due to the fact that it is usually not possible to separate college students into clearly defined classes. However, the U.S. Office of Education regularly reports the number of students enrolled for the first time in institutions of higher education (that is, the entering class of college students) as well as total fall enrolment of all college students. This information, together with data on the number of graduates from high school each spring, makes it possible to project college enrolment by a modified cohort-survival method, which may be described as follows:

Step 1. Compute the ratio of graduates from high school entering college the following fall. If information is not available on the number of high school graduates, this can be estimated from reported enrolment in grade 12 (last year of high school).

Step 2. Add up the entering groups of first-time college students in four successive years (since the normal duration of the college course is four years), and divide into the total enrolment reported for the last of the four years. The resulting ratio indicates the proportion of students entering college for the first time during those four years who have not dropped out up to that time.

Step 3. Project the ratio of college entrants to high school graduates for the future years, based on an average of the observed ratio for a number of years in the past. (In the illustrative example, as reproduced in table VII-15, this average was taken over the four most recent years, neglecting the higher ratios found for the earlier years due to the large influx of college students under the educational benefits provided for veterans of the Second World War).

Step. 4. Project the ratio of total fall enrolment to first-time enrolment cumulated over four successive years. (In the example given, this was also done by taking an average over four years).

Step 5. Compute the first-time-in-college enrolment for the projection years, using projected numbers of high school graduates and the projected ratios of college entrants to high school graduates.

Step 6. From the projected first-time college enrolment and the projected ratios resulting from step 4, compute the total fall enrolment for the projection years.

These steps may be followed more clearly by referring to the illustrative example in table VII-15, for the State of North Carolina.

A further extension of this method was made to project the number of students graduating from college with bachelor's degrees, based on a ratio of the number of such graduates to the entering cohort of first-time college students four years earlier.

Table VII-15 North Carolina : *Projection of fall enrolment in college, by modified cohort-survival method, 1947-1948, 1959-1960*

School year	Graduates from high school (previous spring) (1)	First-time college students (fall enrolment) (2)	Col. 2 divided by Col. 1 (3)	First-time students in 4 successive years (4)	Total fall enrolment (5)	Col. 5 divided by Col. 4 (6)
1947-1948	26 512	13 976	.526	.	.	.
1948-1949	26 025	12 358	.475	.	.	.
1949-1950	28 277	12 693	.449	.	.	.
1950-1951	30 485	12 747	.418	51 774	43 998	.850
1951-1952	30 812	11 709	.380	49 507	40 482	.818
1952-1953	32 040	13 198	.412	50 347	41 765	.830
1953-1954	33 000[1]	13 731	.416	51 385	42 840	.834
Projected :						
1954-1955	34 500	14 145	.410	52 783	44 000	.833
1955-1956	35 600	14 596	.410	55 670	46 400	.833
1956-1957	37 000	15 170	.410	57 642	48 000	.833
1957-1958	37 300	15 293	.410	59 204	49 300	.833
1958-1959	40 800	16 728	.410	61 787	51 500	.833
1959-1960	44 200	18 122	.410	65 313	54 400	.833

1. Estimated.

Source : see table VII-10.

(d) *State of California*

To our knowledge, similar work on projections of school and college enrolment has been done in many of the States and some of the cities and other local areas.[1] We shall, however, confine ourselves to citing only one more example, since the methods used or described in most of the studies are generally quite similar, based either on projections of the school enrolment ratio or of the cohort survival ratio, with various adaptations to suit local conditions and circumstances. For reasons of convenience, we shall take the work done in the State of California, one of the largest States of the United States, with a rapidly growing population and a well-developed system of public and private education at all levels.

In 1954, the Deparment of Finance of the State of California published a report[2] containing projections of public school enrolment to 1960 for elementary schools and to 1965 for high schools, for the State as a whole. In addition, projections for local areas within the State were made of elementary school enrolment up to 1958 and of high school enrolment up to 1961. The number of future graduates from public high schools was estimated for the whole State to 1965-1966, and for each of the local areas to 1964-1965.

For an over-all view we shall first take a look at the recorded and projected enrolment in California public schools, grades K-12, over a period of 34 years between 1924 and 1960, as shown in Chart VII-1. The solid lines show actual recorded enrolment, on a school-year basis from 1924-1925 to 1946-1947, and on fall enrolment basis (as of 31 October) from 1947 to 1953. Projections on fall enrolment basis are shown by the broken lines for the period 1954 to 1960. The line in the lowest part of the chart shows recorded and projected enrolment in the kindergarten; the next line shows total enrolment in elementary schools (grades K-8); the highest line shows the total enrolment in elementary and high schools (grades K-12). Since the chart is drawn on an arithmetic scale, equal distances on the vertical represent equal numbers of pupils. Hence the distance between the bottom of the chart and the first line represents the varying size of kindergarten enrolment; the distance between the first and the second line represents the size of enrolment in grades 1-8; and the distance between the second and the top line represents the size of enrolment in grades 9-12.

In tables VII-16, which is adapted from the original report, total school enrolment, as recorded for 1947-1953 and projected for 1954-1960, is distributed by level of school. Elementary school enrolment is further distributed by three categories: kindergarten pupils, graded pupils in grades 1-8, and special pupils as defined. For high school enrolment, figures are shown separately for graded pupils in grades 9-12, and special pupils as defined. All pupils specifically reported as "adults" or in "classes for adults" are excluded. The high school enrolment is shown projected to 1965.

Table VII-17, also adapted from the report, shows for selected years, the enrolment (recorded or projected) by grade from K (kindergarten) through 12, with totals for grades 1-8 and 9-12 which correspond to the respective figures in table VII-16, account being taken of the fact that special pupils are excluded from table VII-17.

Projections were also made for graduates from public high schools. These projections, together with recorded numbers of graduates for previous years, are shown in table VII-18.

The original report also contains the various projections of enrolment and graduates by fourteen areas into which the State is divided. They are known as "college enrolment areas", since they were first defined for purposes of college enrolment projections. An example of detailed tabulation of enrolment (recorded or projected) by these "college enrolment areas" is given in table VII-19, showing graded enrolment in public high schools, grades 9-12, recorded for 1947-1953, and projected for 1954-1961. (A further division of some of the "college enrolment areas" into subareas is also shown in the report, which we have not reproduced here).

It is stated in the report that the projected enrolments were derived primarily by means of extrapolated "grade progression" ratios. From recorded data on enrolment by grade it was possible to follow each group of pupils in its "progression" through the public education system from one grade to the next. Enrolment records for grades K-12 of California public schools are currently tabulated on 31 October and 31 March of each year. Using the October reports of graded enrolment in grades K-8, grade-progression ratios for the period 1946-1953 were calculated. These ratios were analysed for trend in two ways, described as follows:

The first type of analysis, which may be termed the cross-sectional approach, provided an opportunity for examining the relationship between civilian migration and enrolment changes. It was noted that the grade progression ratios for grades 2-3 through 7-8, for the years 1946-1947 through 1952-1953, tended to show an essential similarity of pattern. This may be seen from Chart VII-2, reproduced from the report, which shows three lines representing the grade progression ratios calculated for 1946-1947, 1948-1949, and 1950-1951. It was found that the topmost line, showing grade progression ratios all above 1.00, corresponded to a period of highest estimated net migration to the State, while the lowest line, showing grade progression ratios mostly bellow 1.00, portrayed the situation during a period believed to have had the smallest net gain of population through civilian migration.[1]

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[1] For example, the States of California, New York, Michigan, Minnesota, Illinois, Indiana, Pennsylvania, Washington; the metropolitan areas of New York, Chicago, Miami, and others.

[2] California. State Department of Finance. *Projections of public school enrolment in California to 1960 and 1965*, by Carl M. Frisen

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[1] Provisional estimates of net civilian migration to California during the three selected periods were: (1946-1947) 220,000; (1948-1949) 100,000; (1950-1951) 270,000.

Table VII-16 California: *Enrolment in public elementary and high schools, 1947-1965*

(In thousands)

Year[1]	Total enrolment	Elementary			High school	
		Kindergarten	Graded (1-8)	Special[2]	Graded	Special[3]
Recorded:						
1947	1 453.1	109.9	968.8	12.5	349.7	12.2
1948	1 533.9	122.1	1 030.7	15.8	353.3	12.0
1949	1 617.0	132.3	1 092.4	17.5	365.5	9.2
1950	1 689.4	137.2	1 150.9	18.0	373.0	10.4
1951	1 836.7	185.4	1 230.3	19.0	390.9	11.1
1952	1 965.1	178.0	1 337.5	20.1	416.5	13.0
1953	2 131.3	212.8	1 434.0	21.4	450.4	12.6
Projected:						
1954	2 298.5	221.0	1 557.4	23.0	483.4	13.7
1955	2 447.0	219.0	1 670.8	24.2	518.6	14.4
1956	2 594.4	233.0	1 754.3	25.1	566.6	15.4
1957	2 748.6	251.0	1 839.8	26.1	615.3	16.4
1958	2 912.0	268.0	1 940.8	27.6	658.4	17.2
1959	2 063.0	270.0	2 055.8	29.2	690.3	17.7
1960	3 193.4	270.0	2 134.7	30.3	739.4	19.0
1961	.	.	.	.	775.6	19.9
1962	.	.	.	.	838.0	21.5
1963	.	.	.	.	898.4	23.0
1964	.	.	.	.	921.3	23.6
1965	.	.	.	.	957.7	24.0

1. As of 31 October.
2. Includes ungraded and postgraduate pupils, pupils in special day and evening classes, and pupils in special classes for physically handicapped and mentally retarded minors.
3. Includes pupils in compulsory continuation classes, special pupils in regular classes, and pupils in special classes for physically handicapped and mentally retarded minors.

Source: California. State Depatment of Finance. *Projections of public school enrolment in California to 1960 and 1965.*

Table VII-17 California: *Enrolment by grade, public elementary and high schools, selected years, 1947-1965*[1]

(In thousands)

Grade	1947	1950	[illegible]3	1957	1960	1965
Elementary:						
K	109.9	137.2	212.8	251.0	270.0	.
1	161.7	185.2	221.7	270.0	309.0	.
2	137.2	170.5	215.1	247.9	300.3	.
3	130.7	162.3	180.7	252.2	281.6	.
4	119.0	140.6	179.2	248.1	261.1	.
5	111.5	131.1	177.2	217.8	247.2	.
6	104.4	126.6	168.3	221.9	253.6	.
7	104.0	120.8	151.3	191.7	256.8	.
8	100.3	113.8	140.6	190.2	225.0	.
High school:						
9	98.9	109.4	137.4	190.3	231.8	272.4
10	94.7	102.3	126.0	177.1	192.3	254.0
11	83.9	88.1	104.0	137.4	169.4	231.5
12	72.1	73.2	83.0	110.5	146.0	199.9
Totals:						
1-8	968.8	1 150.9	1 434.0	1 839.8	2 134.7	.
9-12	349.7	373.0	450.4	615.3	739.4	957.7
K-12	1 428.4	1 661.1	2 097.2	2 706.1	3 144.1	.

1. As of 31 October of each year indicated.

Source: see table VII-16.

Table VII-18 California: *Graduates from public high schools, 1925-1926 to 1965-1966*

School year	Graduate	School year	Graduate	School year	Graduate
Recorded:		*Recorded:*		*Projected:*	
1925-1926	23 992	1940-1941	70 301	1953-1954	83 100
1926-1927	26 852	1941-1942	67 712	1954-1955	90 500
1927-1928	29 011	1942-1943	61 507	1955-1956	98 200
1928-1929	31 520	1943-1944	54 606	1956-1957	105 800
1929-1930	35 236	1944-1945	55 777	1957-1958	110 500
1930-1931	40 117	1945-1946	63 060	1958-1959	120 100
1931-1932	44 157	1946-1947	72 659	1959-1960	137 900
1932-1933	48 503	1947-1948	73 465	1960-1961	146 000
1933-1934	49 316	1948-1949	73 916	1961-1962	148 200
1934-1935	51 728	1949-1950	73 992	1962-1963	149 700
1935-1936	54 213	1950-1951	74 026	1963-1964	177 800
1936-1937	55 100	1951-1952	74 645	1964-1965	174 900
1937-1938	61 417	1952-1953	77 780	1965-1966	199 900
1938-1939	67 599	.	.	.	.
1939-1940	69 353	.	.	.	.

Source: see table VII-16.

Table VII-19 California: *Graded enrolment in public schools, grades 9-12 by college enrolment areas, 1947-1961*

(In thousands)

Year[1]	The State	College enrolment areas[2]													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Recorded:															
1947	349.7	3.1	3.1	5.9	60.2	16.6	3.6	17.2	22.6	21.9	9.0	9.3	139.8	17.1	20.3
1948	353.3	3.2	3.2	6.2	60.2	17.4	3.6	17.3	23.5	21.6	9.5	9.5	140.9	17.8	19.3
1949	365.5	3.4	3.4	6.5	61.4	17.9	3.7	18.2	24.6	23.1	10.0	9.7	145.0	18.4	20.3
1950	373.0	3.6	3.3	6.7	62.0	18.2	3.8	18.6	26.0	23.4	10.3	10.0	147.0	18.7	21.1
1951	390.9	3.9	3.6	6.9	64.9	19.4	4.1	19.2	27.5	23.9	10.7	10.4	154.3	20.1	22.2
1952	416.5	4.3	3.8	7.5	68.4	21.0	4.3	20.3	29.8	25.2	11.4	11.3	163.6	21.7	23.8
1953	450.4	4.8	3.8	8.0	73.5	23.0	4.7	21.8	33.0	26.1	12.2	11.9	177.8	23.6	26.0
Projected:															
1954	483.4	5.2	4.0	8.5	77.6	24.6	4.9	22.9	36.4	27.1	13.3	12.6	192.5	26.0	27.9
1955	518.6	5.6	4.2	9.0	82.1	26.1	5.2	23.9	40.1	27.9	14.2	13.4	208.7	28.1	30.1
1956	566.6	6.1	4.4	9.5	88.9	27.8	5.4	25.3	44.9	28.8	15.2	14.3	232.1	30.7	33.1
1957	615.3	6.6	4.6	10.0	95.4	29.8	5.6	26.7	50.1	29.7	16.2	15.5	255.2	33.6	36.3
1958	658.4	7.0	4.6	10.4	101.1	31.9	5.7	28.2	54.8	30.3	16.8	16.3	275.6	36.2	39.6
1959	690.3	7.3	4.6	10.5	105.0	33.3	5.7	29.0	58.7	30.5	17.0	16.8	290.9	38.2	42.8
1960	739.4	7.6	4.7	10.6	113.2	36.1	5.7	30.0	64.6	31.1	17.4	18.1	311.6	41.2	47.5
1961	775.6	8.3	4.9	10.8	118.3	38.0	5.9	31.0	68.8	31.4	17.5	18.5	327.7	43.3	51.3

1. As of 31 October.
2. Defined for purposes of college enrolment projections.

Source: see table VII-16.

Assuming that the volume of net civilian migration was the primary factor determining the level of elementary school grade-progression ratios in any year, the author proceeded to the next step, which was a year-to-year comparison of these ratios for each grade separately. This may be termed the longitudinal approach, as it seeks to trace the pattern of changes in the ratios through time. Chart VII-3, also reproduced from the report, illustrates this type of analysis, where recorded and projected ratios for the movement of pupils from grade 4 to grade 5 have been plotted for a thirty-year period. In reading this chart, it should be borne in mind that the ratios plotted for the earlier years were based on total school-year enrolment by grade; while beginning with the 1945-1946 ratio the basis for calculation was shifted to the use of 31 October enrolment data.

Though a detailed analysis of the relationship of these ratios to the volume of net migration was not feasible, due to lack of independent estimates of annual migration data it appeared to the author of the report that the peaks and dips shown in chart VII-3 tended "to coincide with similar points in a charting of the numbers of people added to California's population through migration". A comparison of the ratios for other grades suggested to him that, "for grades involving pupils of compulsory attendance age, migration is the major factor determining grade-progression ratio changes".

However, ratios for grades K-2 were found to deviate from this pattern, possibly because of the influence of other factors being more important, such as the growing popularity and availability of kindergarten facilities and changes in the tendency of school authorities to retard first grade pupils. Therefore, in preparing estimates of future enrolment for kindergarten and grade 1, exptrapolation was made of observed trends in the relationship between number of births and enrolment in these grades. The pattern of progression ratios from grade 1 to grade 2 was adjusted on the basis of expected school policy regarding retardation.

For grades 2-8, projections of grade progression ratios were made on the assumption that the volume of migration would tend to decrease from the peak period immediately after the outbreak of the Korean War.

At the high school level, it was believed that factors other than migration also had an important part, such as the increase of opportunities for employment and the drafting of boys into military service – factors which could explain the difference in pattern observed for boys and girls separately. Therefore, projections of grade progression for grades 9-12 were based on stable ratios derived from an examination of the 1946-1953 observations.

According to these various assumptions, future school enrolment grade by grade was estimated by moving each grade forward from its 1953 enrolment to 1960 or graduation, using anticipated grade-progression ratios.

A separate study was made of pupils classified in special categories such as ungraded pupils, those in special classes for the physically handicapped and mentally retarded, and special pupils in regular classes. These pupils represented about 1.5 per cent of total enrolment at the elementary level and 2.5 per cent at the high school level. Since these percentages were found to have changed little over a number of years, it was assumed that they would remain approximately the same throughout the projection period.

Projections of graded enrolment for the college enrolment areas and sub-areas were derived in the same way as the figures for the State as a whole, but the sums of the local area projections were adjusted to agree with the independently obtained totals for the State.

The author had made a short-range test of the grade-progression technique and of the basic assumptions underlying these projections by a comparison of recorded enrolment for October 1953 with two sets of projections, one prepared in February 1952 and the other in April 1953. The highest errors were found in the two projections of kindergarten enrolment, which were approximately 5 and 2 per cent below the recorded enrolment. The other projections of enrolment by grade were found in error by amounts ranging from less than 1 per cent in most cases to between 2 and 3 per cent in three instances.

Now that nearly ten years have passed since the projections published in the 1954 report were prepared, we are naturally interested to know how they compare with recorded figures which have become available in the meantime. A comparison of projected and recorded enrolment in public elementary schools, to 1960, and in public high schools, to 1961, is shown in tables VII-20 and VII-21. It is not surprising that the error of projection tends to rise as the date of recorded enrolment moves farther away from the time when the projections were prepared. On the whole, the error also tends to be greater for projections of high school enrolment than for projections of elementary school enrolment.[1]

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[1] We are indebted to Mr. Carl Frisen, author of the report, and to Mr, Walter P. Hollmann, Senior Research Technician for Population Studies, California State Department of Finance, who kindly supplied us with both a copy of the report and the recorded enrolment data which we have used for comparison.

Table VII-20 California: *Comparison of projected and recorded enrolment in public elementary schools (grades K-8), 1954-1960*

Year	Total enrolment [1]		Error of Projection (Per cent)	Graded enrolment [2]		Error of Projection (Per cent)
	Recorded	Projected		Recorded	Projected	
	(thousands)			(thousands)		
1954	1 787.7	1 801.4	+ 0.8	1 764.5	1 778.4	+ 0.8
1955	1 916.7	1 914.0	− 0.1	1 891.7	1 889.8	− 0.1
1956	2 048.8	2 012.4	− 1.8	2 021.1	1 987.3	− 1.7
1957	2 175.6	2 116.9	− 2.7	2 144.8	2 090.8	− 2.5
1958	2 291.5	2 236.4	− 2.4	2 257.6	2 208.8	− 2.2
1959	2 445.2	2 355.0	− 3.7	2 407.6	2 325.8	− 3.4
1960	2 561.0	2 435.0	− 4.9	2 519.2	2 404.7	− 4.5

1. Includes ungraded, postgraduates, physically handicapped, and mentally retarded.
2. Excludes above categories of special pupils.

Sources: Recorded enrolment from *California statistical abstract*, 1962; projected enrolment from *Projections of public school enrolment in California to 1960 and 1965.*

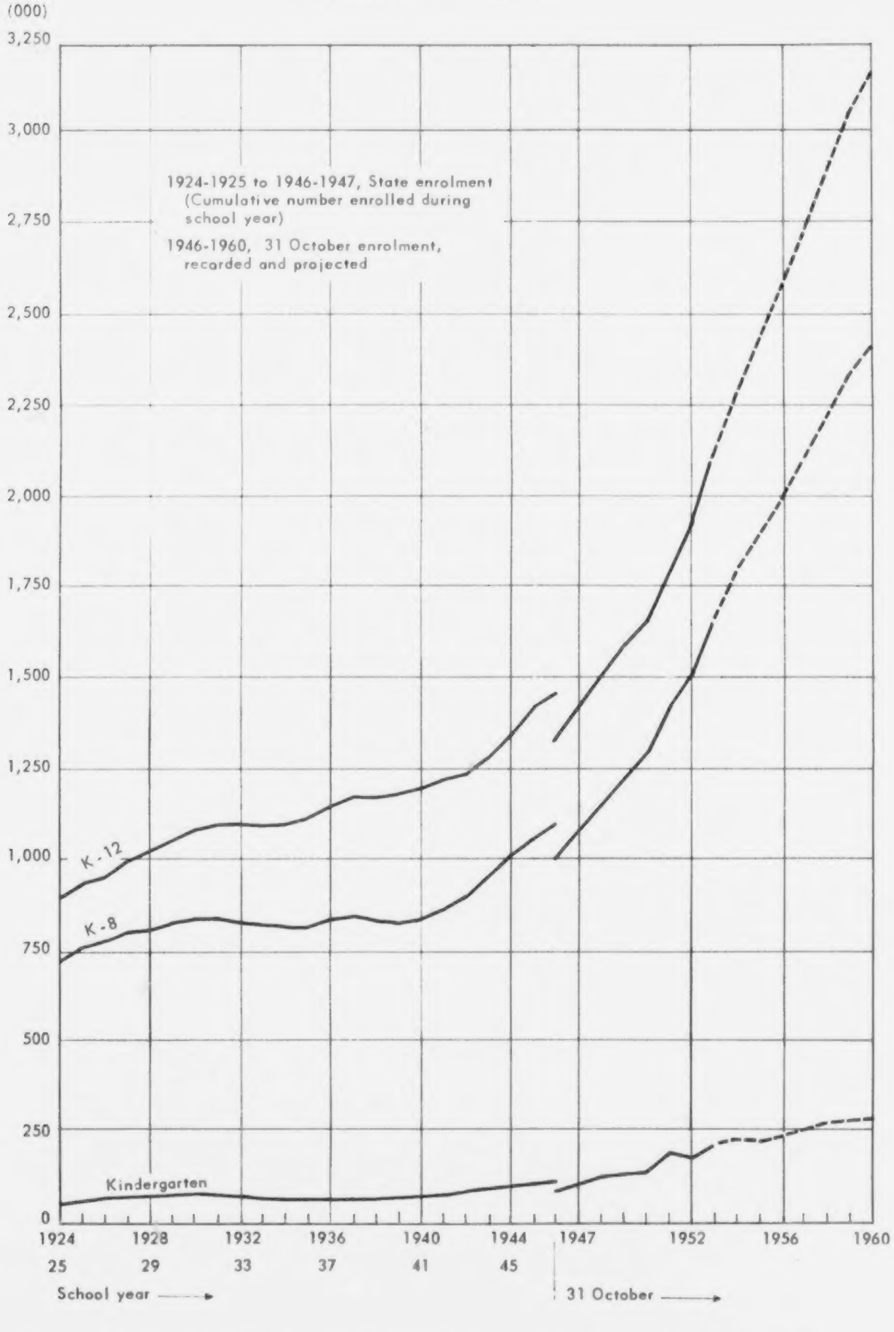
Table VII-21 California: *Comparison of projected and recorded enrolment in public high schools (grades 9-12), 1954-1961*

Year	Total enrolment [1]		Error of Projection (Per cent)	Graded enrolment [2]		Error of Projection (Per cent)
	Recorded	Projected		Recorded	Projected	
	(thousands)			(thousands)		
1954	495.0	497.1	+ 0.4	484.0	483.4	− 0.1
1955	531.4	533.0	+ 0.3	520.2	518.6	− 0.3
1956	585.7	582.0	− 0.6	572.8	566.6	− 1.1
1957	649.2	631.7	− 2.7	634.5	615.3	− 3.0
1958	702.2	675.6	− 3.8	686.5	658.4	− 4.1
1959	745.5	708.0	− 5.0	729.7	690.3	− 5.4
1960	807.1	758.4	− 6.0	785.2	739.4	− 5.8
1961	877.3	795.5	− 9.3	850.9	775.6	− 8.8

1. Includes pupils in continuation classes, physically handicapped and mentally retarded.
2. Excludes above categories of special pupils.

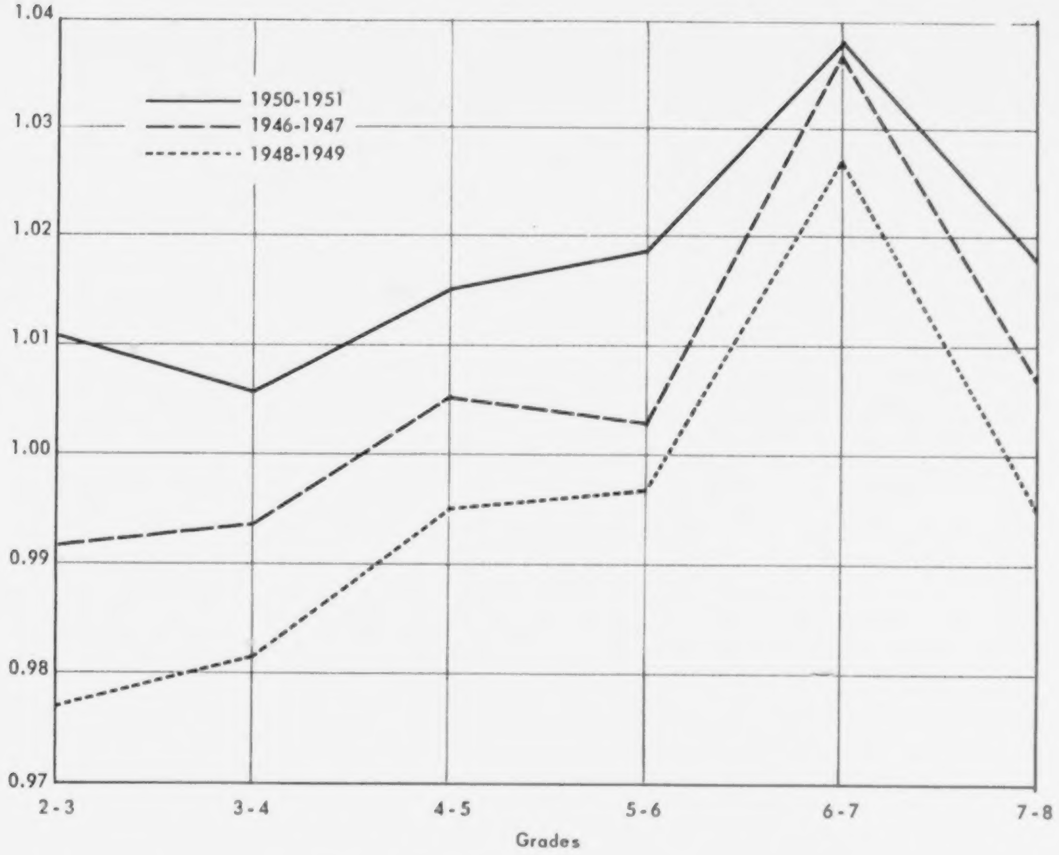
Sources: see table VII-20.

Chart VII-1. California: Graded enrolment in public schools (grades K-12), 1924-1960



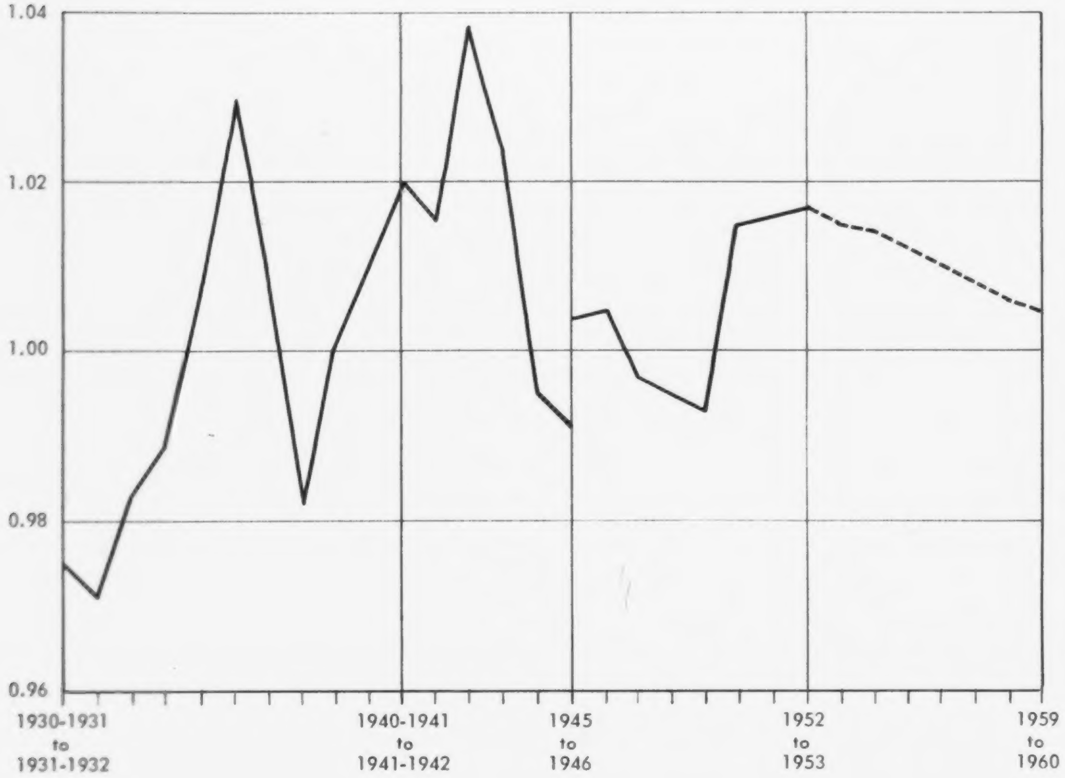
Source: California: State Department of Finance. Projections of public school enrolment in California to 1960 and 1965.

Chart VII-2. California: Grade progression ratios (grades 2 to 8) in public schools, for selected years



Source: California. State Department of Finance. Projections of public school enrolment in California to 1960 and 1965.

Chart VII - 3. California : Grade-progression ratios, grade 4 to grade 5, by school years, 1930/1931 to 1946/1947 ; as of 31 October 1945 to 1960



Source : California. State Department of Finance. Projections of public school enrolment in California to 1960 and 1965.

3. SCHOOL ENROLMENT PROJECTIONS FOR NEW ZEALAND [1]

Projections of school enrolment in New Zealand have been made since 1948 and periodically revised. The first projection, published in 1948, covered a period of only four years. A more elaborate set of "school population estimates" was published in 1950, covering a ten-year period from 1950 to 1960. These related to school enrolment at the first and second levels (primary and post-primary) in public and private schools. Another publication in 1957 contained projections of university enrolment up to 1975.[2]

These various projections have been superseded by the most recent report entitled, *School enrolment projections for the years 1959-1972*, which will be the subject of our examination in this chapter.[3]

Table VII-22, reproduced from the above-mentioned report, gives the latest estimates of total school enrolment in primary and post-primary schools, separately for the public and private schools, for each year from 1959 to 1972. Projections of primary school enrolment for all years after 1967 are shown in a range of highest and lowest estimates, resulting from three alternative series based on different assumptions on the trend of birth rates after 1962. For post-primary school enrolment, two alternative series are shown for each year throughout the projection period.

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[1] We are indebted to Mr. E. G. Jacoby, Research Officer, New Zealand Department of Education, for supplying the documentation and basic information utilized in this section. The reader is also referred to an earlier publication of Unesco, containing much illustrative data from New Zealand. See: Unesco *Educational studies and documents*, No. 32, "Methods of school enrolment projection", by E. G. Jacoby (Paris, 1959).

[2] New Zealand. Education Department. *Annual report of the Minister of Education for the year ended 31 December 1947* (Wellington, 1948); *School population estimates for the years 1950-1960* (document J-5; Wellington, Government Printer, 1950); *New Zealand University enrolment projections to 1975* (Wellington, Government Printer, 1957).

[3] New Zealand. *School enrolment projections for the years 1959-1972* (document E. 2; Wellington, Goverment Printer, 1959).

Table VII-22 New Zealand: *Total school enrolment projections, 1959-1972*

Year[1]	Primary school rolls[2]		Post-primary school rolls			
			Series A		Series B	
	Public	Private	Public	Private	Public	Private
1959	366 250	49 000	89 500	18 150	89 750	18 250
1960	370 850	49 600	99 150	20 000	99 650	20 100
1961	375 550	50 200	109 350	21 900	110 100	22 000
1962	381 900	50 850	115 700	22 850	116 700	23 050
1963	389 500	51 850	119 900	23 350	121 000	23 500
1964	398 950	52 850	122 500	23 700	123 750	23 900
1965	407 400	53 950	124 900	23 750	126 300	24 050
1966	417 200	55 000	127 500	24 000	129 400	24 350
1967	427 200	56 300	130 600	24 400	132 900	24 850
1968	437 000 – 436 800	57 400 – 57 300	134 400	24 800	137 200	25 300
1969	446 800 – 445 300	58 600 – 58 400	138 750	25 350	142 200	25 950
1970	457 100 – 453 600	59 700 – 59 250	143 100	25 800	147 250	26 600
1971	468 000 – 461 300	61 100 – 60 250	147 600	26 300	152 500	27 200
1972	480 000 – 469 000	62 400 – 61 000	152 400	26 900	158 400	27 950

1. Enrolment as of 1 July.
2. Range of figures for 1968-1972 resulting from alternative projections of expected births.

Source: New Zealand. *School enrolment projections for the years 1959-1972.*

Range estimates of university enrolment, over the same period 1959-1972, are reproduced in table VII-23.

Table VII-23 New Zealand: *University enrolment projections, 1959-1972*

Year	Enrolment expected to fall between		
1959	13 700	–	13 000
1960	15 150	–	14 350
1961	16 100	–	15 250
1962	17 150	–	16 150
1963	18 100	–	17 000
1964	19 600	–	18 400
1965	21 700	–	20 250
1966	23 700	–	22 000
1967	25 500	–	23 600
1968	26 800	–	24 700
1969	27 500	–	25 100
1970	28 250	–	25 500
1971	29 400	–	26 200
1972	30 750	–	26 900

Source: see table VII-22.

The methods used in arriving at these projections, as explained in detail elsewhere,[1] consisted essentially of the following operations:

(1) *Estimating the school-age population, by single years of age*

In a country like New Zealand, where compulsory schooling is enforced for all children between the ages of 7 and 15 (in fact, most children begin school at the age of 5), it is easy to see that the principal factor determining future school enrolment is the estimated size of the school-age population. The latter is in turn dependent on the annual number of births, adjusted for survival to a specified age; to which must be added the cumulative net gains in external migration.

(2) *Estimating the enrolment ratio, specific for age*

For New Zealand, this operation has particular significance in respect of children below the age of 7, for it can be shown that children below the minimum age for compulsory schooling are currently enrolled in school in increasing proportion. Another age group requiring special attention are the children between the ages of 13 and 15, some of whom will be attending primary school while others will be at secondary school.

(3) *Estimating the total school enrolment by age of pupil*

From the basic factors of school-age population and enrolment ratio at each age, the total number of children expected to be enrolled in school can be derived. They will then be separated by level of school (primary or secondary) and by public or private school, age by age.

(4) *Estimating "school survival" ratios through the secondary school course*

Starting with actual enrolment data for a number of years, "survival ratios" are worked out between Form II (the last primary class) and each of the succeeding forms. Progression in New Zealand schools from Form III to IV, and from Form IV to V, is normally year by year. Repetition occurs only in Forms V and VI, depending upon the pupils passing certain examinations having to do with school certificates and university entrance. These survival ratios, like the enrolment ratios under step (2), are projected into the future.

(5) *Estimating secondary school enrolment from projected survival ratios*

From the actual and projected enrolment in Form II (the last primary class), and by means of the projected survival ratios, estimates of future enrolment can be obtained for each of the forms through the secondary course, year by year, for the desired number of years.

(6) *Linking of survival ratio with enrolment ratio projections*

The next step in this procedure is to link together the two sets of projections, independently obtained, by means of a cross-tabulation, such as an age-grade classification of pupils normally produced in school statistics. In such a cross-tabulation, the total enrolment by age (obtained by the enrolment ratio method) is set up in one column, say the last column, and the total enrolment by grade or form is set up in one row, say the last row. The grand total of projected enrolment for a given year should obviously be the same, whether by addition of the column or of the row.

(7) *Adjustment of projected ratios to obtain identical totals*

A final step consists in making suitable adjustments in the projected ratios (by age or by grade) so that the grand total of projections by age – using the enrolment ratio method - becomes indentical with the grand total of projections by grade - using the survival ratio method.

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[1] See: Unesco. *Methods of school enrolment projection*; especially chapters III and IV.

We presume that this is the general procedure followed by the New Zealand Education Department in arriving at the estimated classification of pupils in primary and post-primary schools, as shown in tables VII-24 and VII-25. Additionally, estimates are presented of the annual number of children entering primary and post-primary schools, as in table VII-26; and of the annual number of pupils leaving school, by the highest class reached, as reproduced in part in table VII-27.

The proportion of pupils enrolled in public schools in 1958 was 88.1 per cent at the primary school level and 83.0 per cent at the post-primary level. It was assumed that these proportions would rise gradually to 88.5 for primary schools and 85.0 for post-primary schools by 1972.

For projections of school enrolment by districts, it was simply assumed that each district would share in the future enrolment increases of the whole country in the same proportion as it did in the enrolment increases recorded for the period 1953-1958. The resulting district enrolment projections, for a shorter period than the national projections, are illustrated in table VII-28.

Finally, we shall take a look at the enrolment projections published in 1950 and in 1959, comparing them with actual enrolment recorded for the years 1950-1958, and 1959-1962. We note at once, from table VII-29, that the projections published in 1950 on primary school enrolment for the years 1950-1958 were generally not too far off from actual enrolment, the percentage of error ranging from 0.1 to 4.6 ; but the projections for post-primary school enrolment were below the actual enrolment by margins of error ranging from 3.2 to 24.0 per cent. For the years 1959-1962, according to table VII-30, the new projections made in 1959, as far as private primary schools are concerned, were in error by larger margins than before, although there was a marked improvement in the accuracy of projections at the post-primary level. It would be interesting, in another five or ten years, to test if this improved accuracy of projection would hold for the later years covered by these projections.

Table VII-24 New Zealand : *Estimated classification of primary pupils (public and private schools combined) by grade, 1959-1972*

(In thousands)

Year[1]	Primers[2]	Standards				Forms	
		1	2	3	4	I	II
1959	118.3	50.45	49.6	50.15	49.3	50.05	47.4
1960	121.15	50.75	49.7	50.45	49.4	49.65	49.35
1961	124.75	51.95	50.45	50.45	50.0	49.35	48.8
1962	127.7	53.15	51.65	51.15	50.3	49.95	48.85
1963	130.7	54.6	53.0	52.6	50.95	50.0	49.5
1964	134.8	55.8	54.7	53.9	52.35	50.6	49.65
1965	137.2	57.4	55.85	55.2	53.45	51.9	50.35
1966	138.8	59.6	57.45	56.4	54.85	53.2	51.9
1967	141.55	60.1	59.5	57.95	56.1	54.85	53.45
1968[3]	144.9	60.9	60.15	59.85	57.7	56.0	54.9
1969[3]	148.25	62.5	60.95	60.55	59.55	57.6	56.0
1970[3]	151.75	63.95	62.45	61.15	60.4	59.5	57.6
1971[3]	156.25	65.3	64.0	62.7	61.3	60.05	59.5
1972[3]	162.0	67.1	65.4	63.8	62.9	61.1	60.1

1. As of 1 July.
2. A child normally spends 1-1/2 - 2-1/2 years in these classes.
3. Corresponding to the highest alternative projection of births.

Source: see table VII-22.

Table VII-25 New Zealand: *Estimated classification of post-primary pupils (public and private schools combined) by grade, 1959-1972*[1]

Year[2]	Form III	Form IV	Form V	Form VI
1959	40 100	33 850	24 350	9 700
1960	46 450	36 900	26 500	9 900
1961	48 350	43 550	29 350	10 850
1962	48 100	45 850	33 650	12 150
1963	48 150	46 250	36 200	13 900
1964	48 800	46 750	36 850	15 250
1965	48 900	47 650	38 000	15 800
1966	49 600	48 550	39 400	16 200
1967	51 150	49 350	40 550	16 700
1968	52 700	50 800	42 100	16 900
1969	54 100	52 600	43 750	17 700
1970	55 200	53 900	45 750	19 000
1971	56 750	55 150	47 600	20 200
1972	58 700	56 700	49 450	21 500

1. Based on Series (B) projections.
2. As of 1 July.

Source: see table VII-22.

Table VII-26 New Zealand: *Estimated number of children entering school, 1959-1960 - 1971-1972*

Year	Pupils entering primary schools[1]			Pupils entering post-primary schools[2]
	Series (a)	Series (b)	Series (c)	
1959-1960	53 050	(Same as Series	(a))	46 450
1960-1961	55 250	"	"	48 350
1961-1962	55 850	"	"	48 100
1962-1963	57 700	"	"	48 150
1963-1964	59 950	"	"	48 800
1964-1965	59 550	"	"	48 900
1965-1966	60 850	"	"	49 600
1966-1967	62 800	"	"	51 150
1967-1968	63 850	63 800	63 350	52 700
1968-1969	65 500	65 000	64 100	54 100
1969-1970	67 100	66 250	64 850	55 200
1970-1971	69 450	68 100	65 850	56 750
1971-1972	72 400	69 450	67 550	58 700

1. All five-year-olds as of 1 July and those six- and seven-year olds at the same date who were not enrolled on 1 July of the previous year.
2. Pupils on the rolls in Form III (1st year post-primary) as of 1 July; they enter at the beginning of the school year.

Source: see table VII-22.

Table VII-27 New Zealand : *Estimated number of pupils leaving school, by class reached, 1959-1960 - 1971-1972* [1]

Year	Pupils leaving school after completing				
	Primary school[2]	Form III	Form IV	Form V[3]	Form VI[3]
1959-1960	1 100	3 200	7 350	14 450	9 700
1960-1961	1 250	2 900	7 550	15 650	9 900
1961-1962	1 000	2 500	9 900	17 200	10 850
1962-1963	950	1 850	9 650	19 750	12 150
1963-1964	900	1 400	9 400	20 950	13 900
1964-1965	1 050	1 150	8 750	21 050	15 250
1965-1966	700	350	8 250	21 800	15 800
1966-1967	350	250	8 000	22 700	16 200
1967-1968	250	350	7 250	23 650	16 700
1968-1969	300	100	7 050	24 400	16 900
1969-1970	450	200	6 850	24 750	17 700
1970-1971	350	50	6 300	25 550	19 000
1971-1972	250	50	5 700	26 100	20 200

1. Corresponding to series (B) projections of post-primary rolls.
2. It is assumed that in future almost all primary school leavers will go on to post-primary school.
3. Disregarding small changes in number of pupils who stay in Form V or Form VI for more than one year.

Source : see table VII-22.

Table VII-28 New Zealand : *Projections of public primary and post-primary enrolments, by district, 1959-1965*[1]

District	1959	1960	1961	1962	1963	1964	1965
			Public primary school enrolment				
Aukland	80 850	81 975	83 100	84 650	86 475	88 750	90 800
South Aukland	57 800	58 875	60 000	61 500	63 275	65 500	67 475
Taranaki	15 950	16 100	16 275	16 500	16 750	17 100	17 400
Wanganui	23 850	24 150	24 475	24 875	25 400	26 000	26 550
Hawke's Bay	25 425	25 800	26 175	26 700	27 325	28 125	28 775
Wellington	45 400	45 925	46 450	47 150	48 000	49 050	50 000
Nelson	10 175	10 300	10 400	10 525	10 700	10 875	11 075
Canterbury	51 650	52 250	52 850	53 700	54 700	55 925	57 025
Otago	25 650	25 900	26 175	26 550	26 975	27 525	28 000
Southland	15 000	15 175	15 350	15 600	15 900	16 250	16 600
			Public post-primary school enrolment[2]				
Aukland	21 925	24 550	27 300	29 025	30 150	30 875	31 550
Hamilton	14 050	15 925	17 900	19 150	19 975	20 500	20 975
Central	30 900	33 975	37 250	39 300	40 650	41 500	42 300
Southern	22 875	25 200	27 650	29 225	30 225	30 875	31 475

1. Excluding Maori schools, and special schools controlled by the Department of Education.
2. Corresponding to series (B) projections.

Source: see table VI I-22.

Table VII-29 New Zealand: *Comparison of projected and actual enrolment, primary and post-primary, public and private schools, 1950-1958*

Year	Public or Private	Primary		Per cent Error of Projection	Post-primary		Per cent Error of Projection
		Actual	Projected		Actual	Projected	
1950	Public	256 661	255 805	*–0.3*	48 535	46 970	*– 3.2*
	Private	35 775	35 135	*–1.8*	10 511	10 160	*– 3.3*
1951	Public	267 202	266 915	*–0.1*	50 961	48 390	*– 5.0*
	Private	37 109	36 685	*–1.1*	11 045	10 420	*– 5.7*
1952	Public	284 546	282 900	*–0.6*	54 373	50 315	*– 7.5*
	Private	39 342	38 825	*–1.3*	11 622	10 800	*– 7.1*
1953	Public	300 299	296 850	*–1.1*	59 838	52 855	*–11.7*
	Private	41 208	40 650	*–1.4*	12 476	11 340	*– 9.1*
1954	Public	313 272	308 170	*–1.6*	66 638	56 750	*–14.8*
	Private	42 753	42 130	*–1.5*	13 627	12 120	*–11.1*
1955	Public	321 982	317 845	*–1.3*	72 439	60 965	*–15.8*
	Private	44 086	43 420	*–1.5*	14 970	12 910	*–13.8*
1956	Public	333 349	326 210	*–2.1*	75 772	62 255	*–17.8*
	Private	46 261	44 715	*–3.3*	15 823	13 295	*–16.0*
1957	Public	346 247	334 335	*–3.4*	79 172	62 020	*–21.7*
	Private	47 953	45 970	*–4.1*	16 259	13 490	*–17.0*
1958	Public	357 335	340 960	*–4.6*	83 139	63 185	*–24.0*
	Private	48 418	46 995	*–2.9*	16 984	13 725	*–19.2*

Source: Projected enrolment as published in New Zealand. *School population estimates for the years 1950-1960*; actual enrolment data supplied by the New Zealand Department of Education (Research Officer) in June 1963.

Table VII-30 New Zealand: *Comparison of projected and actual enrolment, primary and post-primary, public and private schools, 1959-1962*

Year	Public or Private	Primary		Post-primary		
		Actual enrolment	Per cent Error of Projection	Actual enrolment	Per cent Error of Projection	
					(A)	(B)
1959	Public	366 939	*–0.2*	89 987	*–0.5*	*–0.3*
	Private	51 549	*–4.9*	17 663	*+2.8*	*+3.3*
1960	Public	372 953	*–0.6*	99 913	*+0.8*	*–0.3*
	Private	52 887	*–6.2*	19 293	*+3.7*	*+4.2*
1961	Public	377 514	*–0.5*	110 163	*–0.7*	*–0.1*
	Private	54 079	*–7.2*	20 752	*+5.5*	*+6.0*
1962	Public	385 359	*–0.9*	119 028	*–2.8*	*–2.0*
	Private	55 293	*–8.0*	22 290	*+2.5*	*+3.4*

Source: Projected enrolment as in table VII-22; actual enrolment data supplied by the New Zealand Department of Education (Research Officer) in June 1963.

Table VII - 31 France: *School enrolment, by age groups, 1950-1965*

(In thousands)

School year	Pupils at first and second levels of education[1]							
	Under 6 years	6-13 years	14 years and over	14	15	16	17	18 and over
Estimated:								
1950-1951	1 204	4 385	813	291	208	166	89	59
1951-1952	1 388	4 408	834	297	214	172	90	61
1952-1953	1 451	4 632	864	306	222	179	95	62
1953-1954	1 396	4 886	938	342	241	189	101	65
1954-1955	1 421	5 193	972	336	254	202	109	71
1955-1956	1 434	5 532	973	326	248	208	115	76
Projected:[2]								
1956-1957	1 450	5 809	(A) 1 017	366	245	207	120	79
			(B) 1 023	372	245	207	120	79
1957-1958	1 450	6 005	(A) 1 082	401	275	204	119	83
			(B) 1 099	414	279	204	119	83
1958-1959	1 450	6 212	(A) 1 137	407	301	229	118	82
			(B) 1 169	426	310	233	118	82
1959-1960	1 450	6 380	(A) 1 195	426	305	251	132	81
			(B) 1 247	452	320	259	135	81
1960-1961	1 450	6 362	(A) 1 384	575	319	254	145	91
			(B) 1 467	619	339	266	150	93
1961-1962	1 450	6 313	(A) 1 548	603	432	266	147	100
			(B) 1 662	657	465	282	154	104
1962-1963	1 450	6 247	(A) 1 684	615	453	361	154	101
			(B) 1 827	678	493	387	163	106
1963-1964	1 450	6 170	(A) 1 778	626	461	377	208	106
			(B) 1 954	699	509	410	224	112
1964-1965	1 450	6 093	(A) 1 843	628	470	384	218	143
			(B) 2 152	812	525	423	237	155
1965-1966	1 450	6 045	(A) 1 842	606	471	392	223	150
			(B) 2 432	774	812	437	245	164

1. Excluding apprentice centres ("centres d'apprentissage").
2. For age group 14 years and over, series (A) assumes continuation of trends; series (B) assumes the application of school reform measures beginning in 1964-1965.

Source: France. Institut national d'études démographiques. *Population*, 13^e^ année, n° 2 (avril-juin, 1958).

4. SCHOOL ENROLMENT PROJECTIONS FOR FRANCE

Our example from France is taken from two articles which appeared in *Population*, the quarterly journal of the French National Institute of Demographic Studies.[1] One of these articles gives a summary of projections of school and university enrolment for the ten-year period, 1956 to 1965, which had been adopted by the National Planning Commission (*Commissariat général au Plan*) as basis for action by the government.[2] The other article, which contains two series of projections, covering the first and second levels of education on a longer-term basis, also goes into more detail concerning the methods used in arriving at these projections.[3]

Essentially the methods used in these studies consisted of: (1) estimating the future population by age groups; (2) estimating future school enrolment ratios for each group, separately for first level (primary) and second level (secondary) education; (3) estimating the distribution of future enrolment between public and private schools; (4) estimating the distribution of second level enrolment between general secondary and vocational schools; and (5) estimating the proportion of secondary school graduates entering university faculties.

One of the complications involved in these projections was due to the uncertainties connected with a proposal to prolong the period of compulsory education by two years (that is, from 6 to 15 instead of 6 to 13 years of age), and to reform the school system accordingly. Therefore the projections are given in two alternative series: one of which assumes the continuation of trends without the prolongation of compulsory education, and the other takes into account the immediate and future effects of the prolongation of compulsory education.

Table VII-31, extracted from the report submitted to the National Planning Commission, contains projections of school enrolment by age groups for each of the ten years 1956 to 1965, with estimates derived from school statistics for the years 1950 to 1955. It may be noted that the projections for the age group under 6 years (not under compulsory education) are held to a constant number, which may in fact vary according to the size of the group and the voluntary schooling chosen by the parents. The age group 6 to 13 years inclusive, which comes under compulsory education in any case, is estimated to be nearly 100 per cent enrolled in school. The variation in numbers, reaching a maximum about 1959-1960 and receding after that date, is in accordance with changes in the birth rate, actual or anticipated. For the age groups 14 years and over, two series of projections are given: series (A) based on anticipated continuation of trends, while series (B) assumes certain immediate and later effects resulting from the possible application of school reform measures beginning in 1964, notably the prolongation of compulsory education by two years.

At the first level of education, assuming an increasing share of the enrolment coming under public instruction, reaching about 86 or 87 per cent by 1964, the respective enrolments in public and private schools, pre-primary and primary, are shown in table VII-32. These figures are not directly comparable with those shown in table VII-31, which are based on enrolment projections by age and not by level of education. For example, some of the children under 6 may be found in the primary grades of public and private schools, while a considerable number of the children aged 6-13 years will be enrolled in continuation classes (*cours complementaires*) which are included in the projections for the second level of education. Pupils enrolled in primary classes within secondary schools are excluded from table VII-32; they are apparently also excluded from table VII-33, which deals with projections of school enrolment at the second level.[4]

Table VII-33 gives the estimated and projected enrolments at the second level of education, 1950-1965, as related to the estimated population 11-17 years of age. It may be noted that the ratio of enrolment at the second level, as defined, was expected to rise from about 28 per cent in 1955 to 40 per cent in 1965, without taking into consideration the effects of the proposed school reform mentioned above. Thus the number of pupils enrolled in public and private schools at the second level, excluding the private apprentice centres (*centres d'apprentissage*) was expected to double between 1955 and 1965.

As between public and private schools at the second level, the number of pupils in public schools was expected to more than double between 1955 and 1965, while the increase in private schools was anticipated to be somewhat less than double. However, the percentage of total second-level enrolment attributed to private schools was expected to fall from nearly 30 per cent in 1950 to about 25 per cent in 1965. (See table VII-34.)

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1. We are indebted to M. Jean Bourgeois-Pichat, Director of the Institute, for permission to make use of these articles for illustrative purposes in the present Manual.
2. Fourastié, Jean, "Les travaux de la Commission de l'équipement scolaire du Commissariat général au Plan", *Population* (Revue trimestrielle de l'Institut national d'études démographiques), 13e année, no. 2, avril-juin 1958.
3. Pressat, Roland, "Croissance des effectifs scolaires et besoins en maîtres", *Population*, 13e année, nos. 1-2, janvier-mars et avril-juin 1958.
4. In the school year 1960-1961, for example, there were some 233,000 pupils reported enrolled in primary classes within public and private secondary schools (see *Annuaire statistique de la France*, 1962, page 50, table XXI).

Table VII-32 France : *Distribution of pupils at the first level of education, 1950-1964*

(In thousands)

School year	Public schools		Private schools		Total[1]	
	Pre-primary	Primary	Pre-primary	Primary	Pre-primary	Primary
1950-1951	896	3 218	213	629	1 109	3 857
1952-1953	999	3 473	226	678	1 225	4 151
1954-1955	1 056	3 927	215	720	1 271	4 647
Projected :						
1956-1957	1 073	4 408	210	783	1 283	5 191
1957-1958	1 074	4 511	206	790	1 280	5 301
1958-1959	1 087	4 614	203	789	1 290	5 403
1959-1960	1 099	4 678	199	787	1 298	5 465
1960-1961	1 104	4 665	193	766	1 297	5 431
1961-1962	1 105	4 627	189	741	1 274	5 368
1962-1963	1 109	4 572	183	719	1 292	5 291
1963-1964	1 108	4 512	178	698	1 286	5 210
1964- 1965	1 111	4 458	172	672	1 283	5 130

1. Excluding primary classes in secondary schools.

Source : see table VII-31.

A further distribution of enrolment in public schools at the second level between three types of instruction - general secondary, continuation classes, and vocational (*enseignement technique*), as estimated for 1950-1955 and projected to 1965, is shown in table VII-35. Here it may be seen that the proportion of total enrolment in general secondary schools was assumed to decrease gradually to the 1950 level, and the proportion in vocational schools to increase correspondingly, while the proportion in continuation classes was assumed to remain constant at the 1950 level.

So much for the first two levels of education. At the level of higher education, leaving out all non-university institutions (*les grandes écoles*) and excluding foreign students in the universities, the projections implied an increase on the order of 120 per cent between 1955 and 1965, somewhat higher than the rate of increase in total enrolment at the second level, projected over the same period. It may be of interest to note that the projections imply a much higher rate of growth for the science faculty, a relatively lower rate of growth for the faculties of medicine and pharmacy, and the lowest rates of growth for the faculties of law (*droit*) and arts (*lettres*). (See table VII-36).

Of particular interest from the viewpoint of methodology is the second article mentioned above, which is based essentially on projections of enrolment ratios for the crucial age groups 14, 15 16 and 17, according to two hypotheses : (a) that they would continue previous trends of voluntary schooling at those ages ; and (b) that they would be affected by the possible prolongation of compulsory education by two years, beginning in 1964 or 1965.

Table VII-33 France: *Enrolment at the second level of education, 1950-1965*

(Thousands of pupils)

School year	Population 11-17 years of age[1]	Enrolment at second level[2]		Pupils in public apprentice centres	Total enrolment at second level[3]
		Number	(b) as % of (a)		
	(a)	(b)		(c)	(b) + (c)
Estimated:					
1950-1951	4 471	880	*19.7*	...	...
1951-1952	4 354	906	*20.8*	...	...
1952-1953	4 189	949	*22.6*	153	1 102
1953-1954	4 119	1 007	*24.4*	159	1 166
1954-1955	4 100	1 073	*26.2*	164	1 237
1955-1956	4 111	1 147	*27.9*	168	1 315
Projected:					
1956-1957	4 152	1 229	*29.6*	172	1 401
1957-1958	4 379	1 366	*31.2*	185	1 551
1958-1959	4 684	1 531	32.7	203	1 734
1959-1960	5 038	1 718	*34.1*	218	1 936
1960-1961	5 336	1 888	*35.4*	235	2 123
1961-1962	5 583	2 043	36.6	250	2 293
1962-1963	5 777	2 172	37.6	268	2 440
1963-1964	5 939	2 286	38.5	285	2 571
1964-1965	5 895	2 316	39.3	300	2 616
1965-1966	5 836	2 334	*40.0*	305	2 639

1. As of 1 January during the school year.
2. Excluding preparatory classes in higher education institutes (16,000 in 1956), and primary classes in secondary schools.
3. Including public apprentice centres, but excluding private apprentice centres.

Source: see table VII-31.

Table VII-34 France: *Distribution of pupils at the second level of education, 1950-1965*

(In thousands)

School year	Public schools		Private schools	
	Including apprentice centres	Excluding apprentice centres	Excluding apprentice centres	As per cent of total excluding apprentice centres %
Estimated :				
1950	...	619	260	*29.5*
1951	...	646	260	*28.7*
1952	836	683	266	*28.2*
1953	886	727	280	*28.0*
1954	941	777	296	*27.6*
1955	998	830	317	*27.6*
Projected :				
1956	1 065	893	336	*27.3*
1957	1 183	998	368	*27.0*
1958	1 327	1 124	407	*26.6*
1959	1 483	1 265	453	*26.3*
1960	1 633	1 398	490	*26.0*
1961	1 768	1 518	525	*25.7*
1962	1 885	1 617	555	*25.5*
1963	1 989	1 704	582	*25.4*
1964	2 027	1 727	589	*25.4*
1965	2 044	1 739	595	*25.4*

Source: see table VII-31.

Table VII-35 France : *Distribution of public school pupils at the second level of education, by type, 1950-1965*

(Number in thousands)

School year	Total : second level [1]	General secondary [2]		Continuation classes [3]		Vocational [4]	
		Number	Per cent	Number	Per cent	Number	Per cent
Estimated							
1950-1951	619	320	*51.6*	176	*28.5*	123	*19.9*
1951-1952	646	336	*52.0*	186	*28.8*	124	*19.2*
1952-1953	683	359	*52.6*	196	*28.7*	128	*18.7*
1953-1954	727	381	*52.5*	208	*28.6*	137	*18.9*
1954-1955	777	412	*53.0*	220	*28.3*	146	*18.7*
1955-1956	830	443	*53.3*	238	*28.7*	149	*18.0*
Projected :							
1956-1957	893	478	*53.5*	255	*28.5*	160	*18.0*
1957-1958	998	534	*53.5*	284	*28.5*	180	*18.0*
1958-1959	1 124	600	*53.4*	320	*28.5*	204	*18.1*
1959-1960	1 265	674	*53.3*	360	*28.5*	231	*18.2*
1960-1961	1 398	743	*53.1*	398	*28.5*	257	*18.4*
1961-1962	1 518	803	*52.9*	432	*28.5*	283	*18.6*
1962-1963	1 617	850	*52.6*	461	*28.5*	306	*18.9*
1963-1964	1 704	891	*52.3*	485	*28.5*	328	*19.2*
1964-1965	1 727	896	*51.9*	492	*28.5*	339	*19.6*
1965-1966	1 739	895	*51.5*	496	*28.5*	348	*20.0*

1. Excluding apprentice centres.
2. Excluding preparatory classes of higher education institutions, and primary classes in secondary schools.
3. Excluding vocational sections of continuation classes.
4. Including vocational schools, vocational sections of secondary schools and of continuation classes; excluding apprentice centres.

Source : see table VII-31.

Table VII-36 France : *Distribution of students in university faculties : 1948-1965*

(In thousands)

Academic year	Total number of students[1]	Number of students by faculty				
		Law	Science	Arts	Medicine	Pharmacy
Estimated :						
1948-1949	116.6	34.8	21.4	29.7	23.9	6.7
1950-1951	123.4	35.2	24.3	31.2	26.1	6.7
1952-1953	130.4	36.6	28.1	33.5	25.7	6.6
1954-1955	140.9	37.2	33.9	36.4	26.2	7.3
1955-1956	143.9	34.0	37.2	38.9	26.4	7.4
Projected :						
1956-1957	151.0	34.7	40.2	41.1	27.4	7.7
1957-1958	159.8	35.3	44.5	44.0	27.7	8.2
1958-1959	173.3	39.5	49.2	46.3	29.5	8.8
1959-1960	188.5	41.8	55.3	49.7	32.1	9.5
1960-1961	206.1	45.7	62.1	53.5	34.2	10.6
1961-1962	226.5	49.9	69.4	58.1	37.5	11.7
1962-1963	246.4	53.8	76.1	62.1	41.8	12.6
1963-1964	266.4	57.3	84.5	64.7	46.0	13.9
1964-1965	292.3	62.5	94.4	68.7	51.3	15.3
1965-1966	316.4	66.7	102.9	74.1	56.3	16.5

1. French students only (excluding foreign students) in university faculties (not including other institutions of higher education).

Source : see table VII-31.

Starting with observed enrolment ratios for these age groups for the years 1950-1955, as estimated from official population and school statistics,[1] the author made approximate estimates of these ratios for the school year 1957-1958. These estimated ratios are given as follows :

School year	Estimated school enrolment ratio, by age			
	14-year olds	15-year olds	16-year olds	17-year olds
1950-1951	49.9	35.5	27.2	14.7
1951-1952	52.1	36.9	29.4	14.7
1952-1953	54.1	38.9	30.7	16.2
1953-1954	60.7	42.6	33.0	17.4
1954-1955	65.5	45.1	35.7	19.1
1955-1956	67.4	48.4	36.9	20.3
1957-1958 (approx.)	*72*	*53*	*40*	*22*

These estimated enrolment ratios are plotted and projected to 1980, as reproduced in chart VII-4. The solid lines in this chart represent projections of the enrolment ratio for each of the age groups 14 to 17. This is according to the first hypothesis. Now, under the second hypothesis, assuming that school reform measures would be applied beginning in 1964, and 1965, involving the prolongation of compulsory education by two years, it was anticipated that the enrolment ratios for the 14 and 15-year olds would rise immediately to a level of 98.5 per cent, and that the ratios for the 16 and 17-year olds would then be raised as a consequence. These increased ratios are shown by the broken lines in chart VII-4.

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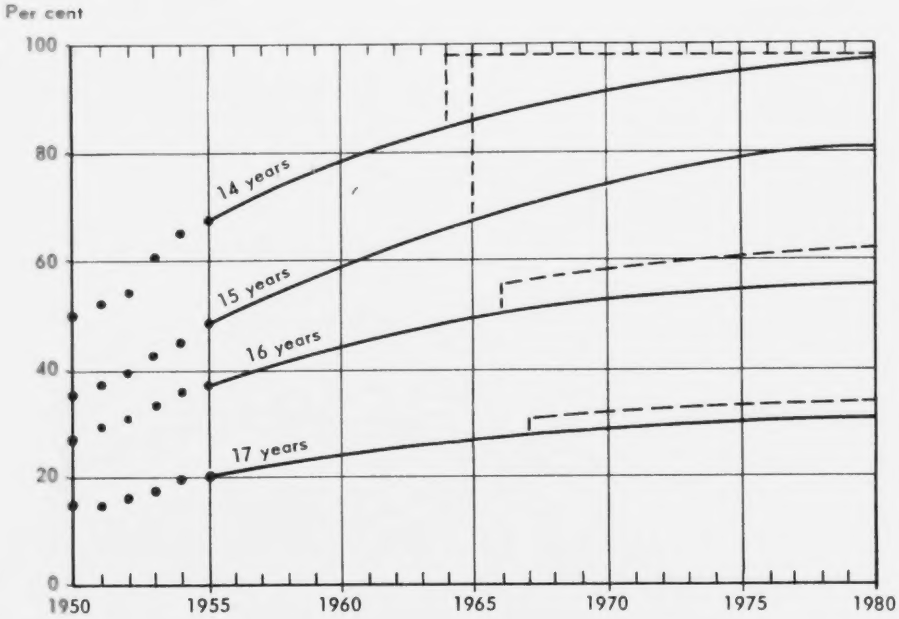
[1] These estimates, as quoted by the author of the article, were prepared by M. Löbel of the National Institute of Statistics and Economic Studies (INSEE), in January 1957, for the use of the Planning Commission.

Chart VII-4. France: Projection of school enrolment ratios for the population 14, 15, 16 and 17 years of age, according to two hypotheses



Source: France. Institut national d'études démographiques. Population. 13ᵉ année, nº 1, janvier-mars 1958.

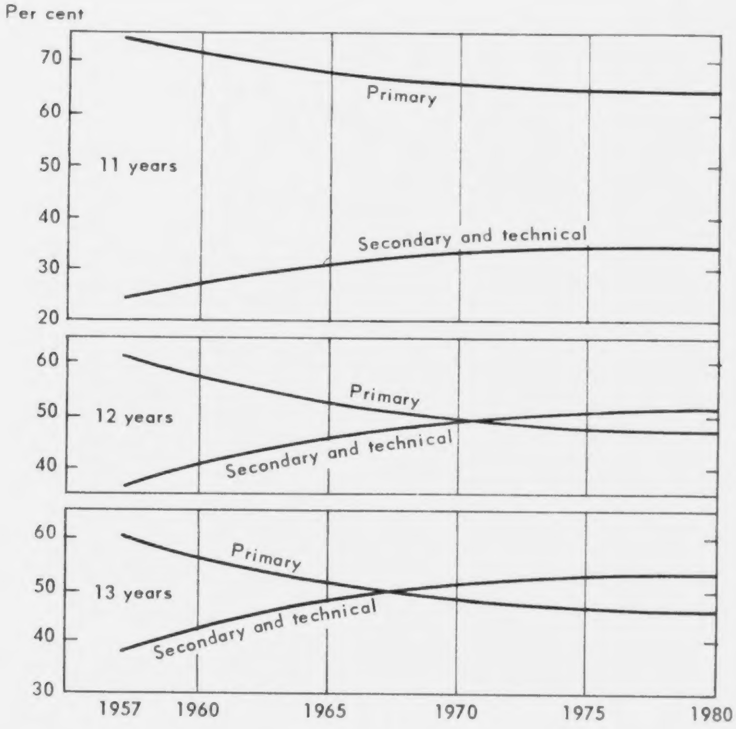
The next step in the procedure, as explained in the article, was to estimate enrolment ratios by level of education for each age group from 6 to 17 years. These ratios, estimated for 1957, were as follows:

Age group	Estimated school enrolment ratio, by level		
	First level	Second level	Both levels
6-year olds	98.5	–	98.5
7-year olds	98.5	–	98.5
8-year olds	98.5	–	98.5
9-year olds	97.1	1.4	98.5
10-year olds	90.3	8.2	98.5
11-year olds	73.8	24.7	98.5
12-year olds	61.5	37.0	98.5
13-year olds	60.2	38.3	98.5
14-year olds	15.0	57.5	72.5
15-year olds	2.5	50.5	53.0
16-year olds	1.0	39.0	40.0
17-year olds	0.3	21.7	22.0

Now, under the hypothesis of no change in the period of compulsory education, the enrolment ratio of the 11, 12 and 13-year olds may be split between the first and second levels and each portion projected forward to 1980, making sure that any increase in the second-level ratio must be accompanied by a corresponding reduction in the first-level ratio (since the children could not be enrolled in primary and secondary schools at the same time). Projections of these respective enrolment ratios for the age groups 11, 12 and 13, from 1957 to 1980, are shown in chart VII-5.

Similarly, the school enrolment ratios projected for the 14 to 17 age groups must be reduced by the percentage of pupils at those ages still found in primary grades, in order to obtain second-level enrolment ratios projected to 1980. Only here a modification must be introduced under the second hypothesis, namely, that the period of compulsory education might be prolonged till the child reaches the age of 16. Some assumptions will have to be made as to the distribution of the 14 and 15-year olds between the two levels of education.

Chart VII-5. France: Projection of school enrolment ratios for the population 11, 12 and 13 years of age, by level of education, 1957-1980



Source: See chart VII-4.

Without following in detail the arguments put forth by the author, we shall merely mention that he assumed a slight reduction in the proportion of the 14-year olds allocated to the second level of education (under the assumption that they would be subject to compulsory education), while the proportion of 15-year olds in second-level education would be slightly increased.

The school enrolment ratio of children under 6 (that is, 3, 4, and 5-year olds) was found to be approximately 60 per cent. An assumption was made that this ratio might rise to 65 and remain constant at that level. Allowance was made, on an over-all basis, for those aged 18 years and over still enrolled in schools at the second level.

With further assumptions as to the distribution of second-level enrolment between public and private schools, and among the three major types of second-level education in public schools, the author presented two tables containing his projections of school enrolment at the first level as far as 1980 and at the second level as far as 1986. These are reproduced as tables VII-37 and VII-38. Compared with tables VII-31 to VII-35, they are roughly consistent though different in certain details.

Table VII-37 France : *Projected enrolment at first and second levels of education,* without *prolongation of compulsory education*

(Thousands of pupils)

School year	First level (primary; public and private)[1]	Second level education					
		Public and private	Private	Public			
				Continuation courses	Lycées and collèges	Vocational	Total public
1957	5 315	1 698	475	330	544	349	1 223
1958	5 411	1 873	515	365	603	390	1 358
1959	5 459	2 073	562	405	669	437	1 511
1960	5 428	2 309	617	452	748	492	1 692
1961	5 366	2 518	662	494	818	544	1 856
1962	5 312	2 680	691	527	875	587	1 989
1963	5 260	2 790	709	549	914	618	2 081
1964	5 202	2 873	727	564	940	642	2 146
1965	5 154	2 903	735	568	947	653	2 168
1966	5 088	2 932	739	572	956	665	2 193
1967	5 034	2 946	742	573	959	672	2 204
1968	4 970	2 967	745	578	966	678	2 222
1969	4 903	2 988	750	582	974	682	2 238
1970	4 840	3 009	755	586	981	687	2 254
1971	4 784	3 021	755	589	986	691	2 266
1972	4 744	3 029	757	591	988	693	2 272
1973	4 716	3 022	756	589	986	691	2 266
1974	4 714	3 014	753	588	983	690	2 261
1975	4 737	2 988	747	583	975	683	2 241
1976	4 773	2 978	745	581	971	681	2 233
1977	4 829	2 970	742	579	969	680	2 228
1978	4 896	2 971	743	579	969	680	2 228
1979	4 972	2 986	747	582	974	683	2 239
1980	5 051	3 013	753	588	983	689	2 260
1981	...	3 052	763	595	996	698	2 289
1982	...	3 103	776	605	1 012	710	2 327
1983	...	3 160	790	616	1 031	723	2 370
1984	...	3 223	806	629	1 051	737	2 417
1985	...	3 288	822	641	1 073	752	2 466
1986	...	3 353	838	654	1 094	767	2 515

1. No estimates of primary school enrolment are made after 1980 since estimates of future births are available only up to 1975.

Source: France. Institut national d'études démographiques. *Population*, 13e année, nº 1, janvier - mars, 1958.

Table VII-38 France: *Projected enrolment at first and second levels of education,* with *prolongation of compulsory education by 2 years in 1964 and 1965*

(Thousands of pupils)

School year	First level (primary: public and private)[1]	Second level education					
		Public and private	Private	Public			
				Continuation courses	Lycées and collèges	Vocational	Total public
1965	5 450	2 952	747	578	963	664	2 205
1966	5 360	3 017	760	589	984	684	2 257
1967	5 289	3 050	769	593	992	696	2 281
1968	5 206	3 084	774	600	1 005	705	2 310
1969	5 129	3 102	779	604	1 010	709	2 323
1970	5 052	3 127	785	609	1 019	714	2 342
1971	4 985	3 142	786	612	1 025	719	2 356
1972	4 934	3 143	786	613	1 025	719	2 357
1973	4 898	3 130	783	610	1 021	716	2 347
1974	4 882	3 115	779	607	1 016	713	2 336
1975	4 896	3 090	772	603	1 008	707	2 318
1976	4 926	3 072	768	599	1 002	703	2 304
1977	4 976	3 059	765	596	998	700	2 294
1978	5 039	3 059	765	596	998	700	2 294
1979	5 110	3 071	768	599	1 002	702	2 303
1980	5 187	3 098	775	604	1 010	709	2 323
1981	...	3 137	784	612	1 024	717	2 353
1982	...	3 188	797	622	1 040	729	2 391
1983	...	3 245	811	633	1 059	742	2 434
1984	...	3 308	827	645	1 079	757	2 481
1985	...	3 373	843	658	1 100	772	2 530
1986	...	3 439	860	670	1 122	787	2 579

1. No estimates of primary school enrolment are made after 1980 since estimates of future births are available only up to 1975.

Source: see table VII-37.

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